

JPRS-TND-89-005
20 MARCH 1989



JPRS Report

Nuclear Developments

Nuclear Developments

JPRS-TND-89-005

CONTENTS

20 MARCH 1989

CHINA

First Nuclear Waste Sites To Be Built [Hong Kong SOUTH CHINA MORNING POST 20 Feb]	1
Permanent Nuclear Waste Dumps Planned [CHINA DAILY (BUSINESS WEEKLY) 20 Feb]	2
Nuclear Power Station To Come On-Line in 1990 [XINHUA]	3
Official Cited on Plans for Nuclear Power [CHINA DAILY (BUSINESS WEEKLY) 20 Feb]	3
Zou Jiahua Inspects Qinshan Nuclear Power Site [ZHONGGUO TONGXUN SHE]	4
Nuclear Power Official Reviews Projects [Beijing Radio]	4
New Stations Planned at Nuclear Power Conference [Beijing International]	4
Switching Military to Civilian Production Urged [ZHONGGUO XINWEN SHE]	5
New Achievements With Beijing Collider Reported [ZHONGGUO XINWEN SHE]	5
Pressurized Water Reactors Planned for Plants [XINHUA]	6

EAST ASIA

INTER-ASIAN

Japan, Taiwan Agree on Nuclear Cooperation [KYODO]	7
--	---

JAPAN

Government Approves Euratom Nuclear Fusion Pact [KYODO]	7
---	---

NORTH KOREA

Peace Committee Rejects Chemical, Nuclear Arms [KCNA]	7
---	---

TAIWAN

Economics Minister on Building Nuclear Plant [CNA]	8
--	---

EAST EUROPE

CZECHOSLOVAKIA

First 1,000-Megawatt Nuclear Reactor Tested [RUDE PRAVO 20 Feb]	9
Delays in Nuclear Program Hit Skoda Concern [RUDE PRAVO 11 Feb]	9

GERMAN DEMOCRATIC REPUBLIC

Talks Held in Paris on Nuclear Safety Cooperation [NEUES DESTSCHLAND 16 Feb]	9
--	---

POLAND

Protest Against Building Nuclear Power Plant [Warsaw Radio]	9
---	---

LATIN AMERICA

ARGENTINA

Senators Ask CNEA for Report on Nuclear Dump [ENERGEIA Nov 88]	10
--	----

BRAZIL

Proceedings of First CSPN Meeting Discussed	12
Samery Pledges Peaceful Use [O GLOBO 25 Jan]	12
Angra III Completion Sought [O ESTADO DE SAO PAULO 26 Jan]	12

CUBA

Visit of Soviet Atomic Power Official Reported	13
Meets With Vice President [Havana TV]	13
Tours Nuclear Power Plant [Havana TV]	13
Signs Nuclear Safety Agreement [Havana TV]	13
Meets With Castro [Havana TV]	13

NEAR EAST AND SOUTH ASIA

INDIA

Government Spokesman Comments on Pakistani Bomb Progress [PATRIOT 14 Jan]	14
Consequences of Pakistani Nuclear Program Noted [PATRIOT 10 Feb]	14
Gandhi Rules Out Any More Nuclear Submarines [Delhi Radio]	15
Bangalore Meeting Discusses Safety in Nuclear Plants	16
AEC Chairman, Others Speak [THE TIMES OF INDIA 12 Dec]	16
No Assurances Given [THE HINDU 12 Dec]	17
Safety Precautions at Nuclear Power Plants Described [THE HINDU 16 Dec]	17
Campaign Against Soviet-Aided Nuclear Plant Unfolds [THE HINDU 24 Dec]	19
Light Water Leak Shuts Down Rajasthan Nuclear Plant [THE TIMES OF INDIA 8 Jan]	20
Atomic Power Plant in Kalpakkam Shut Down [Delhi TV]	20
New Ion Accelerator for Tata Research Institute [THE TIMES OF INDIA 29 Dec]	20
Conference on Nuclear Reaction Mechanism Opens [THE TELEGRAPH 4 Jan]	20
Plutonium To Be Used as Fuel for Rajasthan Plant [THE TIMES OF INDIA 15 Dec]	21
Trees Used in Method of Prospecting for Uranium [THE HINDU 13 Jan]	22
Minister Opens Nuclear Science Center [PATRIOT 20 Dec]	22

PAKISTAN

Indian Source Reports Bomb Ready for Testing [Bombay THE TIMES OF INDIA 13 Jan]	22
Surface-to-Surface Missiles Successfully Tested [Islamabad Radio]	23
Scientist Denies Missiles Carry Nuclear Warheads [Islamabad Radio]	23
Saudi Arabia To Aid Defense Production Program [Delhi Radio]	24

SOVIET UNION

Armenian Nuclear Plant Unit To Shut Down [TASS]	25
Public Rejects Secrecy on Nuclear Waste [KOMSOMOLSKAYA PRAVDA 21 Feb]	25
Baklanov Inspects Thermonuclear Installation [Moscow Radio]	26

WEST EUROPE

EUROPEAN AFFAIRS

Protest To Be Lodged Against French Nuclear Plant [Bern International]	27
--	----

CANADA

Darlington Reactors Expected To Start on Schedule [THE GLOBE AND MAIL 18 Jan]	27
Proposed Nuclear Plant for Saskatchewan Sparks Controversy [THE OTTAWA CITIZEN 26 Jan]	28
Ontario Hydro Pondering Tritium Sale to United States [THE OTTAWA CITIZEN 10 Jan]	28
No Home Found Yet for Experimental Slowpoke Reactor [THE OTTAWA CITIZEN 22 Dec]	29

FEDERAL REPUBLIC OF GERMANY

USSR Scientists Install Magnet for Hera Particle Accelerator	[VDI NACHRICHTEN 2 Dec]	29
Nuclear Exports to Pakistan Reported	[DER SPIEGEL 20 Feb]	30
Nuclear Center on Cooperation With Pakistan	[DPA]	32
Shutdown of AVR Pebble-Bed Reactor Examined	[Stuttgart VDI NACHRICHTEN 11 Nov]	32

UNITED KINGDOM

Contingency Plans for Nuclear Disaster Reviewed	[THE DAILY TELEGRAPH 9 Jan]	34
Details of Loss of Uranium, Plutonium Released	[THE DAILY TELEGRAPH 11 Jan]	34

First Nuclear Waste Sites To Be Built
*HK2002025089 Hong Kong SOUTH CHINA
MORNING POST in English 20 Feb 89 pp 1-2*

[Article by Seth Faison in Beijing]

[Text] China plans to build its first permanent nuclear waste storage sites, one in the coastal province of Zhejiang and another in the northwest, an official newspaper reported yesterday.

Refuse from the Daya Bay nuclear power plant and the Qinshan plant near Shanghai, both scheduled to go into operation in the next few years, will be stored at the Zhejiang facility.

The proposed dumps, which will be lined with steel and placed five to 30 metres underground, will each occupy dozens of hectares, and were described by BUSINESS WEEKLY as China's first permanent nuclear waste storage sites.

China has been involved in nuclear production for over 25 years. While it is not known how waste from nuclear weapons has been stored during that time, radioactive waste from the country's 20-odd non-military nuclear production enterprises has to date been kept in the basements of concrete buildings, said Mr Pan Ziqiang, director of safety department in China's National Nuclear Industry Corporation.

The storage sites, which exist in half of China's 30 provinces, are useful for only 10 years, and Mr Pan said all waste currently stored in them will eventually be transferred to the permanent sites—an exercise which, in the Zhejiang case, is expected to cost tens of millions of yuan.

Mr Pan acknowledged that there is public concern over the safety of nuclear waste disposal in China—where environmental protection is usually considered less important than cost.

Discussions were held last month between his corporation and Zhejiang officials, but he did not reveal their response.

"The most important factor is public opinion and support from the local governments," Mr Pan was quoted as saying.

But he defended China's record on nuclear safety, saying he was unaware of any "noticeable" nuclear pollution accidents, although minor ones have occurred.

Late last year, for example, 15 people were exposed to radiation at a factory in Nanjing after a piece of uranium was "lost," the newspaper said.

A law on the prevention of nuclear pollution is currently being drafted, Mr Pan said, and will be added to the 32 existing laws and regulations on safety in the nuclear industry.

Mr Qu Geping, director of the State Environmental Protection Bureau, said there have been cases of "improper management of small quantities of medical and industrial nuclear waste." But he maintained that China has not experienced any radioactive spillage or contamination.

At Daya Bay, installation of the first of two 900 megawatt reactors will begin in September, said Mr Liang Hanzhao, deputy manager of the Guangdong Nuclear Power Company. He described construction at the site as "steady."

The Guangdong Government is also planning to build an additional station next to the Daya Bay plant and two other nuclear power stations elsewhere in the province.

At Qinshan, 30 million yuan (HK\$63 million) has been allocated for preparatory work in the second stage, where two 600 megawatt reactors are scheduled for completion in 1985. The first stage, a 300 megawatt reactor, is scheduled to go into operation next year.

Chinese officials have said they aim to earmark 80 percent of all new nuclear enterprises for the production of civilian items such as nuclear instruments, automatic fire alarms, building materials and other light industrial products.

While coal still provides around 70 percent of China's energy needs, officials are eager to expand their nuclear power capacity and are hoping to open several more nuclear plants in the mid-1990s.

Feasibility studies on nuclear plants for Fujian, Shanghai, Hainan, Liaoning and Heilongjiang have already begun.

China's main nuclear testing site is at Lop Nor in the Xinjiang Uygur autonomous region in the far northwest, an area mainly made up of uninhabited desert and mountains.

The northwest's Gobi Desert has been mentioned as a potential radioactive waste dump site. In 1987, China and a West German company discussed a proposal for China to store West German nuclear wastes in the Gobi Desert in return for West German power plants.

Nothing came of the proposal, partly due to transportation problems.

Permanent Nuclear Waste Dumps Planned
HK2002074089 Beijing CHINA DAILY
(BUSINESS WEEKLY) in English 20 Feb 89 p 1

[Article by staff reporter Yuan Zhou]

[Text] The first permanent nuclear waste dumps in the country are to be built in east and northwest China where most of the civilian and military nuclear industry is located.

One is likely to be in Zhejiang Province where the 300-megawatt Qinshan nuclear plant goes into operation next year. Four 600-megawatt reactors will be added in Qinshan's second and third phases.

This dump also will receive the nuclear refuse from the 1,800-megawatt plant at Daya Bay, Guangdong Province, which is expected to come into operation between 1992 and 1993.

A second dump is to be in Northwest China where nuclear weapons tests take place.

Professor Pan Ziqiang, director of the safety department of China National Nuclear Industry Corporation, said that technically there were no problems in building such disposal places for nuclear waste.

"The most important factor is public opinion and support from the local governments," he said in an interview.

Pan's corporation, set up to replace the former Ministry of Nuclear Industry, employs 300,000 workers and is responsible for the production of nuclear weapons and power plants.

He revealed that discussions had taken place in mid-January between his corporation and officials from Zhejiang Province on the possibilities of building a permanent nuclear waste dump there.

More talks are to take place with Zhejiang provincial leaders over the dump, which would occupy dozens of hectares of land. It would require an investment of tens of million yuan, he said.

If the dumps are built, the nuclear wastes will be put in steel containers and buried 5 to 30 metres beneath the ground.

Pan said that at present all nuclear wastes from the score of nuclear production enterprises under his corporation have been put in basement storages of cement structures.

"Such storages are for short-term use only; the nuclear wastes can be put there for about 10 years," he said.

All nuclear wastes now in temporary storages probably will be transported to the permanent dumps for greater safety.

Qu Geping, director of the State Environmental Protection Bureau, said half of all provinces now had storage facilities for their industrial and medical nuclear wastes.

"China has very strict control of its nuclear waste and possesses advanced technology for the treatment of it," he said.

There have been cases of "improper management of small quantities of medical and industrial nuclear wastes," he admitted. But no serious cases of nuclear pollution have occurred.

Last December, 15 people were exposed to radiation, including one worker who suffered third-degree burns, after a piece of uranium material was lost from a factory in Nanjing.

Pan, who also is deputy director of the Radiation Protection Association of the Chinese Nuclear Society, said he was not aware of any "noticeable" nuclear pollution accidents in China.

He said radiation levels from the country's nuclear industry are far below the state safety standards, according to results from an official evaluation of environment qualities taken over the last 30 years.

The government has ruled that the radiation does limit from the nuclear industry be 100 milli roentgen equivalent man (MREM) per year, compared with the former 500 MREM a year.

Pan said the nuclear industry is virtually harmless to people since the natural radiation levels are around 300 MREM a year.

This year, his safety department will set a ceiling for the total discharge, instead of a mere density, of radiation from each nuclear production enterprise under his corporation.

He disclosed that a law is being drafted on the prevention of nuclear pollution. There already are 32 laws and sets of regulations on the safety of nuclear industry. The Atomic Energy Law and Regulations on Emergencies in Nuclear Power Stations will go into effect after approval from proper authorities.

Pan has visited West Germany, France and the United States to compare notes on nuclear pollution with his foreign counterparts.

Nuclear Power Station To Come On-Line in 1990

OW1302110789 Beijing XINHUA in English
1055 GMT 13 Feb 89

[Text] China's first nuclear power station will go into operation in 1990.

The Qinshan Nuclear Power Station in east China will have a first-phase capacity of 300,000 kilowatts.

Addressing a meeting here today, Jiang Xinxiong, general manager of the China National Nuclear Corp. (CNNC), said that the most difficult technical work in the completion of the station's first phase has now been finished.

Jiang also disclosed that preparatory work has begun on the project's second phase—the construction of a double-reactor nuclear power station with a capacity of 600,000 kilowatts.

Nuclear power is increasingly being seen as a solution to China's chronic energy and transportation shortages and pollution problems, he said.

Li Yingxiang, spokesman for CNNC, told XINHUA that the Qinshan Nuclear Power Station will mark the beginning of China's nuclear power industry.

Construction of a second nuclear power station with a capacity of 1.8 million kilowatts began in 1987 in Guangdong Province.

Jiang told the meeting that the success of the two projects will play an important role in the future development of nuclear power in China.

According to informed sources, China will also build a number of large-scale nuclear power stations in Liaoning, Jiangsu, and Fujian Provinces, and in the city of Shanghai between 1991 and 1995.

Official Cited on Plans for Nuclear Power

HK2002074289 Beijing CHINA DAILY
(BUSINESS WEEKLY) in English 20 Feb 89 pp 1-2

[Article by staff reporter Xu Yuanchao]

[Text] The State will allocate 30 million yuan this year for preparatory work of the second stage at the Qinshan Nuclear Power Plant in east China's Zhejiang Province.

The site of the second stage, which will have two 600-megawatt reactors, is two kilometres from the first stage of the project, a 300-megawatt pressurized water reactor now under construction.

Zhang Huailin, executive manager of the Qinshan Nuclear Power Company, said the preparatory work will include land leveling, electricity and water supplies and

road construction for the civil engineering works which will begin next year. The second stage of the plant is scheduled to be completed by 1995.

Zhang gave an interview in connection with a national conference on nuclear energy sponsored last week by the China Nuclear Industry Corporation.

Zhang said that the No 2 Nuclear Engineering Design and Research Institute, in co-operation with foreign firms, has been awarded the bid to design the plant's second stage. Negotiations with French and West German companies are still under way.

The government will earmark 390 million yuan for the first stage of the plant this year. By the end of last year, China invested 710 million yuan in the first stage.

The China Nuclear Industry Corporation wants the first stage of the plant completed by the end of next year to ensure enough electricity for the east China power grid.

Zhang said the power shortage is becoming acute in Zhejiang, where electricity to the state-owned enterprises is supplied for only four days a week. Township enterprises have electricity for only two days a week.

East China, covering Zhejiang, Jiangsu, Anhui Provinces and the Municipality of Shanghai, is the most developed area in China. Its agricultural and industrial output value account for one-fifth of the country's total, and profits turned over to the government make up about 25 percent of the national total.

The fast development of local economies in recent years makes the region short 6 billion kilowatt hours of electricity a year.

By the end of the century, the power plants in the area will generate 200 billion kilowatt hours, but that will still be 120 billion kilowatt hours short.

The Qinshan plant will become the mainstay of the infrastructure in east China and play an extremely important role in economic development, Zhang said.

Construction of China's second nuclear power plant at Daya Bay in south China's Guangdong Province has made steady progress, said Liang Hanzhao, deputy manager of the Guangdong Nuclear Power Company Ltd.

He said installation of the plant's first 900-megawatt reactor will begin in September.

The 1,800-megawatt nuclear plant is designed to produce 10 billion kilowatt hours of electricity annually, of which 70 percent will be supplied to Hong Kong and the rest to Guangdong, Liang said.

He said: "Construction of this plant will not be able to meet the local demand for power, but we can accumulate experience for other nuclear plants."

He said Guangdong has selected another two sites for nuclear plants to be built in the open coastal areas. One is adjacent to the Daya Bay and the other is in Taishan County.

A senior power industry official of Guangdong said the province should go the "road of France" to place its emphasis on the development of nuclear power plants after the year 2000. Guangdong is rich neither in coal reserves nor in hydroelectric power resources.

The first group numbering 50 technicians will go to France for training in April after finishing their training courses at home by March. The second group of 35 people is expected to go there in October.

Zou Jiahua Inspects Qinshan Nuclear Power Site
HK1602045389 Hong Kong ZHONGGUO TONGXUN SHE in Chinese 0359 GMT 15 Feb 89

[Unattributed article: "Zou Jiahua Says China Must Embark on the Road of Developing Nuclear Power"]

[Text] Hong Kong, 15 Feb (ZHONGGUO TONGXUN SHE)—According to news released by the China Nuclear Industry Corporation, Chinese State Councillor Zou Jiahua said that China must embark on the road of developing nuclear power and should make greater efforts to develop a long-term perspective on nuclear power during his recent inspection of the construction site of the Qinshan Nuclear Power Plant and the construction site of the Phase-2 Qinshan Project.

Zou Jiahua arrived at Qinshan on 13 February. He said that at present, China is suffering from a serious energy shortage. China's coal resources and coal production capacity are very limited. By the year 2000, China's annual coal output will reach 1.4 billion tons whereas China's annual demand for coal will reach 2 billion tons. Under such circumstances, China must increase efforts to develop nuclear power. Although it costs more to develop nuclear power, China will increase her investment in the construction of nuclear power plants.

Speaking on the question of building nuclear power plants in cooperation with foreign countries, Zou Jiahua said that such Sino-foreign cooperation can take diversified forms and can be carried out in three ways: China carries out design with foreign partners providing consultative services, China carries out the design and foreign partners carry out the manufacture, or China and her foreign partners jointly carry out the design and manufacture. In a word, China should take her own road in developing nuclear power by bringing into full play her existing domestic technologies and by learning from the experiences of advanced foreign countries.

Nuclear Power Official Reviews Projects

OW1502142189 Beijing Domestic Service in Mandarin 1030 GMT 13 Feb 89

[Text] Jiang Xinxiong, general manager of the China National Nuclear Power Corporation, said in Beijing today: In launching China's nuclear power industry, the construction of the stations at Qinshan and Dayawan not only install the image of nuclear energy in the people's minds but also the development of China's nuclear power industry. Therefore, we must make these two projects a success.

Jiang Xinxiong told reporters: In developing the two plants, quality and safety first have been stressed as the guiding principles from the beginning. Rules on quality control, rate of progress, and comprehensive on-site management have been strictly enforced.

Several fairly difficult engineering tasks have been completed for the first-stage of the Qinshan Nuclear Power Plant. The safety shell, dome-shaped top, and reactor vessel have been hoisted into position. Welding has begun on the major pipes with excellent results. The power plant is expected to generate electricity in 1990.

Construction of the Dayawan Nuclear Power Plant in Guangdong is currently in full swing. More than 37 meters of inner steel liner for the No 1 reactor vessel have been installed, and this rate of progress is remarkable. Technological experts say that the history of world nuclear power plant construction indicates that the issue of safety is mainly in the hands of management. If management is strengthened and the management system perfected, the safety factors of a nuclear power plant are as high as those of thermal or hydraulic power plants.

According to informed sources, under the Eighth 5-Year Plan, China will complete the 2d- and 3d-stage construction of the Qinshan Nuclear Power Plant and also build a number of large-scale plants in Liaoning and the coastal areas of southeastern China. China plans to build more nuclear power generators to bring total power output to 6 million kilowatts by the end of this century, thereby laying a foundation for an annual nuclear power output of 1.2 million kilowatts by the year 2000.

New Stations Planned at Nuclear Power Conference

OW1602104489 Beijing International Service in Mandarin 0900 GMT 14 Feb 89

[Text] A working conference of the China Nuclear Power Industry Corp., which was held on 13 February, revealed that China will build a group of large-scale nuclear power stations in Liaoning Province of the northeast and coastal areas of the southeast from 1990-95 and strive to ensure that, by the end of the century, generating units totaling 6 million kw are completed and another 6-million-kw generating units are under construction. China is now building two nuclear power stations.

According to Jiang Xinxiong, president of the China Nuclear Power Industry Corp., the 1st-phase project of the Qinshan Nuclear Power Plant in eastern China and the Dayawan Nuclear Power Plant in southern China have respectively entered into the installation stage and a high peak of construction. The Qinshan Nuclear Power Plant will be hooked up with the power grid and put into operation next year.

Switching Military to Civilian Production Urged
HK1602083289 Beijing ZHONGGUO XINWEN SHE
in Chinese 1311 GMT 13 Feb 89

[Text] Beijing, 13 Feb (ZHONGGUO XINWEN SHE)—Jiang Xinxiong, general manager of the China Nuclear Industrial Corporation, emphasized here today that to promote China's nuclear industry and strengthen its ability of self-development, it is necessary to concentrate our strength on developing civilian products so that an economic entity characterized by diversified production can be gradually formed.

He said: Last year, a good trend of switching from military to civilian production appeared in the corporation. The gross output value of the civilian products produced by nuclear industrial enterprises reached more than 500 million yuan, which was 33.7 percent of the gross industrial output value. The output value of scientific research rechanneled from military science research institutes and offices was 68 million yuan.

Of the large numbers of military enterprises that have been switched to civilian production, 18 projects are on the list of the state's major technological transformation projects. By the end of last year, 12 of these projects had already been completed. The rest will be completed by the end of this year. A report on the second group of 30 major technological transformation projects has been submitted to the state, and the construction of 13 began before the due date.

Contracts on some large-scale projects for technology import were also signed or initialed last year, including the import from France of a large-scale chemical fertilizer plant which will be capable of producing 300,000 tons of synthetic ammonia and 520,000 tons of urea a year; the import from Yugoslavia of high-grade titanium white production technology capable of producing 10,000 tons of titanium white a year; the import from the U.S. of a zinc battery production line, which had been put into production last year; and the import from Switzerland of the technology for manufacturing Type-F732 ion detectors, which had also been put into production last year. After these projects are completed, they will produce leading products in the switch from military to civilian production.

Jiang Xinxiong said the strategic shifting of military technologies to technologies for civil use is the greatest structural readjustment since the founding of the state. Despite great difficulties, initial results have been

achieved in the readjustment of the nuclear industrial product mix. In the next 2 years, it is expected that the output value of the civilian products produced by the corporation will increase by 20 percent annually, and its profit will increase by 15 percent. The output value of the civilian products will reach 700 to 800 million yuan in 1990.

New Achievements With Beijing Collider Reported

HK1702051189 Beijing ZHONGGUO XINWEN SHE
in Chinese 1431 GMT 16 Feb 89

[Unattributed article: "Chinese Scientists Score New Achievements With Beijing's Electron Collider"]

[Text] Today it was learned from the High Energy Physics Research Institute of the Chinese Academy of Sciences that Chinese scientists have achieved a new result in the operation of the Beijing Electron-Positron Collider [BEPC]. The new record was two times the 30th power of 10 every square-centimeter-second under the condition of the collision between positive and negative electrons with 1.6 billion electron volts.

According to experts, this record exceeds the highest level attained within this energy zone by the same type of accelerator in other countries.

The BEPC, which cost 240 billion yuan, is mainly used to reveal the secrets of the microlevel structure of material. It was put into operation and first realized the collision between positive and negative electrons on 16 October 1988. This marked another major scientific achievement by China after the successful explosion of nuclear bombs and the successful launching of manmade satellites.

Professor Fang Ningxian briefed reporters on the operation of the collider in the past 4 months.

The so-called brightness degree refers to the number of particles involved in collision every second on each square centimeter of area, and this is one of the main indicators for measuring the properties of the collider. Through 2 months' research, Chinese scientists have achieved the highest brightness degree in the energy zone of 1.6 billion electron volts, thus fulfilling the task that took foreign counterparts 1 to 2 years.

Prof Fang also said that, since 16 October 1988, the BEPC has been operating in a normal condition for more than 2,700 hours. The instruments and equipment reached a high technological level in the operation, and this showed that the design of the collider was successful. The quality of manufacture and installation was also better than expected. Now the collider can be used for various high-energy physics experiments. In May of this year, Chinese scientists will use it to conduct the first scientific experiment.

Pressurized Water Reactors Planned for Plants
OW1702221589 Beijing XINHUA in English
1547 GMT 17 Feb 89

[Text] China will use more 600,000-kilowatt pressurized water reactors for its planned nuclear power stations in a bid to reduce the cost of such projects, a government minister said here today.

Addressing a national meeting on nuclear industry, Huang Yipeng, minister of energy resources, said: "This type of reactor is suitable for China because it is safe and not too expensive."

The minister said that, in the long run, China must develop its nuclear power industry in substitution for coal, which accounts for 75 percent of China's energy source.

Huang said that China will develop the nuclear power industry on the basis of self-reliance with foreign help where needed.

Sources say that China will add four 600,000-kilowatt reactors in Qinsan, Zhejiang Province, east China, in addition to the 300,000-kilowatt nuclear power station which is now under construction.

INTER-ASIAN

Japan, Taiwan Agree on Nuclear Cooperation

OW2202045989 Tokyo KYODO in English
0340 GMT 22 Feb 89

[Text] Japan and Taiwan have reached an unofficial agreement to promote information exchanges on nuclear power plant and reactor operations to prevent possible nuclear disasters, an industry body said Wednesday.

The Japan Atomic Industrial Forum (JAIF) said the 3-year accord also calls for notifying each other at an early stage in the event of a nuclear facility accident.

A memorandum regarding the accord was signed in Taipei Monday by visiting JAIF Chairman Kazuhisa Mori and Chen Lan-kao, president of Taiwan's Chung-hwa Nuclear Energy Society.

The agreement also calls for exchanging information on safety measures to prevent accidents at nuclear power plants and other nuclear facilities through such means as the holding of seminars, JAIF officials said.

It was also agreed to extend mutual assistance requested in the event of nuclear accidents, the officials said.

Member states of the International Atomic Energy Agency (IAEA) earlier ratified two multilateral agreements to notify the signatory states of nuclear accidents at their early stages. The move came after the Chernobyl nuclear disaster and the delay in reporting it by the Soviet authorities that stirred an international outcry.

Taiwan, which does not belong to the IAEA, has not established any channels through which the Taipei government can notify other governments of nuclear accidents.

The latest accord has provided a private-sector channel through which information on nuclear accidents can be obtained, industry sources said.

In Taiwan, a total of six nuclear power plants are operational at present. Four are boiling-water reactors and two pressurized-water reactors.

JAPAN

Government Approves Euratom Nuclear Fusion Pact

OW1762030689 Tokyo KYODO in English
0131 GMT 17 Feb 89

[Text] Tokyo, Feb. 17 KYODO—The Japanese Government Friday approved the conclusion of a nuclear fusion cooperation agreement with the European Atomic Energy Commission (Euratom), officials said.

The agreement, enabling promotion of exchanges of information on nuclear fusion tests and personnel between Japan and Europe, will be signed in Brussels next Monday local time, they said.

NORTH KOREA

Peace Committee Rejects Chemical, Nuclear Arms

SK2902110589 Pyongyang KCNA in English
1052 GMT 20 Feb 89

[Text] Pyongyang February 20 (KCNA)—Our people will not allow in the future either the test, production and stockpile of nuclear and chemical weapons and their introduction from outside and will never permit the transit of foreign nuclear and chemical weapons through the territory, territorial waters and airspace of our country, as made clear in a statement of the Ministry of Foreign Affairs of the Democratic People's Republic of Korea some time ago.

This is declared by a spokesman of the Korean National Peace Committee in a statement published on February 20 in denunciation of the chemical war preparations accelerated by the U.S. imperialists in South Korea.

Pointing out that the U.S. imperialists are not only intensively deploying binary chemical weapons in South Korea, but also massively producing chemical weapons, having built a chemical weapon factory and storages there, and are perfecting the operational method of using chemical weapons through the "Team Spirit" joint manoeuvres, the statement says:

This is a clear proof that the U.S. imperialists scheme to turn South Korea, a nuclear forward base where more than 1,000 pieces of nuclear weapons are deployed, into a most dangerous war powder magazine packed with chemical weapons, too, and force upon our people even a chemical scourge on top of nuclear holocaust.

The Korean National Peace Committee, in the name of the entire Korean people, bitterly denounces the chemical war preparations by the U.S. imperialists, regarding them as a most barbaric and hideous criminal act to massacre the Korean people and an open challenge to the desire of the world peace-loving people who demand a total elimination of chemical weapons and to the cause of world peace.

It is one of the most urgent questions for defence of world peace and security at the present juncture to ban the production, deployment and use of chemical weapons and totally eliminate them.

The international conference on banning chemical weapons held recently in Paris reflected this very demand.

Nevertheless, the U.S. imperialists had hastened the development and production of chemical weapons in open disregard of the 1925 Geneva international accord

on the prohibition of chemical weapons and these days are putting greater spurs to the production of binary chemical weapons, the most dangerous weapons of this kind. Keeping already millions of pieces of chemical weapons in storage, the U.S. imperialists plan to produce one million more binary chemical weapons in the ten years to come.

The U.S. imperialists' reckless moves in making preparations for nuclear and chemical war, while hastening the production of nuclear and chemical weapons behind the screen of "disarmament" are becoming graver, further encouraged by the No Tae-u puppet clique.

The South Korean puppet clique is begging of their U.S. masters to introduce more nuclear and chemical weapons into South Korea and committing without hesitation such treacherous act as offering the land of South Korea to the U.S. imperialists as a nuclear and chemical war base.

The Korean people, who had suffered from bacteriological and chemical weapons during the past war forced by the U.S. imperialists, can never tolerate the criminal moves of the U.S. imperialists to commit inhuman and bestial atrocities in Korea again.

The U.S. imperialists must discard an anachronistic ambition, discontinue producing and stockpiling chemical weapons in South Korea and unconditionally withdraw U.S. troops and all nuclear and chemical weapons from South Korea.

The U.S. imperialists and the South Korean authorities must promptly stop the aggressive "Team Spirit" joint military exercises and affirmatively respond to our proposal for converting the Korean peninsula into a nuclear-free, peace zone without chemical weapons.

We will in the future, too, as in the past, make all our efforts to prevent a nuclear and chemical holocaust,

achieve a durable peace on the Korean peninsula and build a world free from nuclear and chemical weapons, a peaceful new world.

TAIWAN

Economics Minister on Building Nuclear Plant
OW1502054889 Taipei CNA in English
0340 GMT 15 Feb 89

[Text] Taipei, Feb. 15 (CNA)—Economics Minister Chen Li-an said Tuesday that although some local people are strongly opposed to the construction of a new nuclear power plant, he thinks "the Government should build the plant in spite of any difficulties because the project will benefit the majority of the people."

Chen told reporters that the proposed nuclear power plant, the Republic of China's fourth, is not only important for the nation's future economic development but also important for the general public's daily life.

The minister said he believes most people will not oppose the construction of the nuclear power plant. The problem, he said, is that no one wants the plant to be built in their neighborhood.

To resolve the problem, Chen said his ministry will reconsider plant site proposals. He did not rule out the possibility of building the plant on an offshore island.

Minister Chen also warned local people of a possible hike in international oil prices, saying that oil prices may go up by the end of the year if the Soviet Union joins OPEC (The Organization of Petroleum Exporting Countries) nations in controlling oil output.

International oil prices have firmed recently because of an OPEC program to prop up prices by reducing output. As a result of the price rise, the per barrel purchase costs of the state-run Chinese Petroleum Corporation passed U.S. \$14 last month.

CZECHOSLOVAKIA

First 1,000-Megawatt Nuclear Reactor Tested *AU2202170189 Prague RUDE PRAVO in Czech 20 Feb 89 p 2*

[CTK report: "The First 1,000-Megawatt Reactor After the Pressure Test"]

[Text] Plzen—The workers and technicians collective of the Reactors manufacturing plant at the Plzen Skoda factory has successfully completed a pressure test on the vessel and lid of the first Czechoslovak nuclear reactor of the VVER 1,000 type. Control measurements on the steel colossus confirmed that these parts of the first 1,000-megawatt reactor were qualitatively manufactured.

On Friday [17 February] the working crew raised the unique weldment, with a diameter of 5.3 meters, a length of 13 meters, and a mass of 350 tonnes, from the testing shaft, and on Saturday further control and measuring operations continued.

Also, there will occur in turn ultrasonic and capillary methods that will check whether there are cracks or other defects in the welded anticorrosion layer or in the basic material.

Work on the first vessel of the VVER 1,000 light-water reactor has thereby reached the final phase. Toward the end of March, the finished piece will begin being shipped to the Belene nuclear power station in Bulgaria.

Delays in Nuclear Program Hit Skoda Concern *AU1402142989 Prague RUDE PRAVO in Czech 11 Feb 89 p 1*

[CTK report: "Search for the Restoration of Financial Balance"]

[Excerpts] Prague (CTK)—The 38 loss-making enterprises that the CSSR Government charged with working out so-called consolidation programs at the end of last year also include Czechoslovakia's largest engineering giant—the Skoda Plzen concern. [passage omitted]

According to Jiri Kubicek, director of the enterprise, analyses of the enterprise's insolvency confirm that the main causes of this are unrecovered claims. Last September customers' outstanding bills totalled Kcs1.5 billion and accounted for almost 90 percent of the level of insolvency. Inventories not financially covered accounted for the remaining Kcs200 million, by which the Skoda concern is in the red.

The government resolution on consolidation programs must not be perceived as a punitive measure against the enterprise, but rather as a means of coming to terms with problems that negatively affect financial balance.

These problems also include the nuclear program issue. Domestic and foreign investors in nuclear power plants are delaying the taking over of supplies, and are thereby increasing the Skoda concern's inventories. Additional difficulties also arise from this, such as the search for an alternative production program and the retraining of staff. [passage omitted]

GERMAN DEMOCRATIC REPUBLIC

Talks Held in Paris on Nuclear Safety Cooperation

*AU1702184889 East Berlin NEUES DEUTSCHLAND
in German 16 Feb 89 p 1*

[Text] Paris (ND)—In talks that ended on Wednesday [15 February—FBIS], delegations headed by State Secretary Prof Georg Sitzlack, president of the GDR Office for Nuclear Safety and Radiation Protection, and Jean-Pierre Capron, administrator general of the French Commissioner's Office for Nuclear Energy, have advocated the deepening of cooperation between the GDR and France in the safe use of nuclear energy. On the basis of the records reached during the official visit of Erich Honecker, SED Central Committee general secretary and GDR State Council chairman, to Paris in January 1988 to increasingly include the peaceful use of nuclear energy in cooperation of the two countries, the talks focused on the safe operation of nuclear plants as well as on the protection of man and his environment from radiation.

The GDR delegation had an opportunity to make itself familiar with special security measures in France's most modern nuclear power plant at Nogent-sur-Seine. In addition, the further development of radiation protection control methods was discussed at facilities of the French radiation protection service.

France holds the top position in the world in the peaceful use of nuclear energy. At present, more than 50 nuclear power plants supply more than 70 percent of the country's electrical energy.

POLAND

Protest Against Building Nuclear Power Plant *LD2402232789 Warsaw Domestic Service in Polish 1800 GMT 24 Feb 89*

[Excerpt] On Friday at about 1600, a group of several dozen young people in the Long Market [in Gdansk] near the Fountain of Neptune tried to organize a mini protest march against the construction of a nuclear power station at Zarnowiec. The young people went down the Long Market shouting slogans and scattering leaflets calling for a halt to the construction of Zarnowiec, pointing out the danger that comes from building a nuclear power station in our country. [passage omitted]

ARGENTINA

Senators Ask CNEA for Report on Nuclear Dump 51002045 Buenos Aires ENERGEIA in Spanish No 66, Nov 88 pp 16-17

[Text] Argentine Senators Alfredo Benitez and Hebe Corchuelo Blasco have requested information from the PEN [National Executive Body] and from the CNEA [National Atomic Energy Commission] on the development and siting of a nuclear dump in the Gastre area in Chubut province. They are requesting further information about the need to have this dump available between the years 2005 and 2010, when no country in the world—even those which are most advanced in this field—has yet built a final nuclear waste storage facility. Their request also asks for data on the area's "geological stability" in order to ensure a future of 1 million years, the amount of time needed to eliminate the dangers of radioactivity. Their information request further states that the studies carried out for a year to locate the work in the "solid rock core" are inadequate (Sweden and the United States, which have had real laboratories established for over 10 years, have still not issued final reports, even though they have more data and technology available on stable areas which have been free from seismic activity and earthquakes for 600 million years). In addition to mentioning possible volcanic emanations that could split open the storage facility, releasing such dangerous material into the environment, the information request also mentions the matter of hydraulic conductivity and the possibility that bodies of water in movement might transfer the radioactive material to the human, animal or plant environment. The information request also asks why the studies recommended by the Regional Underground Water Center have not been carried out. Among other possible flaws, this request also cites a lack of knowledge about the terminal conductivity of the rock in nearby areas, which could be endangered by placing this nuclear waste storage facility in its vicinity. The request for information (Communication Bill S/676/88) concludes by asking whether "cooperation in nuclear matters" includes the possibility that other countries might put their radioactive wastes in Gastre. The reasons underlying the information request are given in the following text [signed by Senators Hebe Corchuelo Blasco and Alfredo L. Benitez].

In 1978 the Atomic Energy Commission made the "political decision" to begin work toward the construction of a storage facility for highly radioactive wastes. Since that time (and continuing until the present), studies and projects have been conducted, which have attempted to provide a technical justification of this project. Despite the amount of time which has elapsed, at the present time there are no adequate and reliable grounds which, considered in a broad perspective, can truly show the benefits of such a decision.

For this reason it is imperative to generate complete scientific and technical information to evaluate the suitability of building such a storage facility and the place of

its possible siting, while scrupulously respecting all the reasons or opinions found in the existing and future reports, even though they may not agree with the present studies on this issue.

The method of final disposal of highly radioactive wastes in geological formations, on which the research efforts of the countries that are most advanced in nuclear development have concentrated for over a decade, attempts to superimpose on an "engineering barrier" (a material that sets and covers the radioactive wastes), a "geological barrier," which will keep the wastes insulated from the biosphere for a period on the order of 1 million years, so that future generations will be protected from the dangerous effects of these wastes.

Being able to guarantee that a geological formation will provide a sufficiently effective barrier to keep radionuclides from being released into the human environment during that extremely long period of time is a real scientific challenge, one which has created new problems that, given their complexity, have not yet been fully resolved. For this reason, the underground storage of radioactive wastes is still considered internationally to be in a study and research phase, even in countries at a more advanced stage of nuclear development than Argentina, and which face ongoing domestic pressures to resolve the environmental issues related to the use of nuclear energy. This is the case, for example, with: Sweden, which has 12 nuclear power plants operating; France, which has 53 nuclear power plants operating and 10 under construction; the Federal Republic of Germany, with 21 nuclear power plants now operating and four under construction; and the United States, which has 106 nuclear power plants operating and 13 under construction.

The critical aspect of this methodology is site selection. Essentially, it must meet two basic requirements: geological stability and minimization of the possibility that the underground water will allow radionuclides to escape into the biosphere. This creates an essential requirement to conduct extremely extensive and serious geological, tectonic and hydrogeological studies, which are some of the activities designed to evaluate a location in terms of its aptitude for the siting of a waste storage facility. Nonetheless, in Argentina, just a short time after we decided to proceed with the construction of a waste dump, and without carrying out any of the essential studies required to make that decision, the Atomic Energy Commission surprisingly chose the Sierra del Medio in the Bajo de Gastre area in Chubut province as a geologically suitable site for the installation of this waste storage facility, even though the existing studies of the geology of the region offer clear indications of its instability (on the edge of a geological fold, the presence of occasional volcanic emanations, an area of high compression which has been active since the tertiary, phenomena associated with neotectonic activity).

We must point out that, as periods of insulation on the order of 1 million years are required, the region's geological stability is a vital factor in the selection of a possible site, as only in locations within areas which have been geologically stable for many millions of years can we hope that no significant future disturbances will occur within the necessary period of insulation. This consideration, therefore, suggests that highly stable areas, such as exist in northern Europe, should be chosen as geological shields. Since the precambrian rocks which make up the geological shield in southern Sweden have not changed or shifted during the last 600 million years, it is reasonable to assume that no significant movement or faulting activity will occur there during the next million years.

But on the contrary, the situation existing in the Gastre area is quite different, as the rocks are much younger there, and have been affected by tectonic processes during the last million years: there is evidence of neotectonic activity in the alluvial fans of the mountain faces. So it is technically unacceptable for the Atomic Energy Commission, without even undertaking a study of this neotectonic evidence or of the volcanic emanations existing in the Bajo de Gastre, to assume that the area is geologically stable, basing this assumption on a mathematical extrapolation to 100,000 years of seismic data measured during the brief period of 1 year.

But this is not the only aspect which must be considered in the selection of a site for the installation of a nuclear waste repository. Just as important as predicting the geological stability of the region is being able to predict the long-term behavior of the underground water table circulating in and around the rocky mass, as this is the most probable means of conveying radionuclides into the biosphere.

No matter how small the quantity of water circulating in the rock, and no matter what may be the quality of the material and the fill material used to set the radioactive wastes, at some time in the future the wastes will become exposed to the action of underground water, which will begin to carry these wastes into the human environment. Only a thorough, detailed and extensive hydrogeological investigation will allow us to determine if this transport of radionuclides will be so slow that it will delay their arrival into the biosphere long enough so that their effects will not exceed those of natural radiation. For this reason both regional hydrogeological research and a detailed study of the rocky mass are essential. Internationally, the need to proceed by conducting "on site" experiments in places which may be selected to install radioactive waste storage facilities has been recognized and accepted. Therefore, in recent years many countries have established underground laboratories in the geological formations being studied, so that they will be able to learn the real conditions prevailing around the projected storage facility and evaluate any possible changes in these conditions after the installation of such a facility.

The way this issue has been handled in the Gastre area does not stand up to the slightest analysis. In terms of the regional phase, the Atomic Energy Commission decided that the hydrogeological studies have already been completed, even though the very institution which performed these studies (the Regional Underground Water Center, an agency of the National Department of Water Resources) explicitly stated in its reports that the study was only a preliminary study and needed to be further expanded in order to confirm or correct their hypotheses. Concerning the hydrogeological study of the rocky mass, the Atomic Energy Commission's proposal lacks any technical seriousness, since it is going to be restricted to measurements of a few parameters to be done in the four deep drillings already completed, of which in reality only one can provide hydrogeologically valid data, as the others did not cross the underground water's possible circulation courses.

These serious flaws in the geological, tectonic and hydrogeological studies serve as an example showing how the selection of the Gastre area for the installation of the nuclear waste storage facility resulted from a decision made in great haste, a decision which lacked a minimally acceptable technical foundation. Despite the complexity of the issue, it continues to be handled, as it was in 1978, by a small group of bureaucrats, without allowing the nation's scientific and technical community to make their appropriate input.

If the method of handling radioactive wastes is intended to have the problem resolved by the generations that are enjoying the benefits of nuclear energy, and not by future generations, it is unacceptable for the options selected to lack a solid and unquestionable technical and scientific foundation, the sole guarantee that the actions to be taken will not produce undesirable consequences affecting future generations, whose future will depend on our making appropriate decisions.

The difficult issue of nuclear waste storage also involves basic aspects of social life. For this reason, the community has the unquestionable right to be kept informed about the handling of these wastes, in order to protect their interests, which others now claim to be interpreting and protecting. No decision made on this issue will produce positive effects or will be a correct decision, unless the community understands it, accepts it, and shares it, within a context of unconditional respect for the human person.

In brief, these are the reasons underlying this new request which we are now filing for the consideration of the Senate. This request follows another earlier request which the Senate approved in 1987 at the initiative of Senator Rivas, which unfortunately did not receive an adequate response. The official information received in response to that request was incomplete and lacked depth in its technical considerations. It thus underestimated the Senate, not considering the Senate an appropriate forum to understand and analyze the issue of nuclear waste management.

BRAZIL

Proceedings of First CSPN Meeting Discussed

Samery Pledges Peaceful Use

51002046 Rio de Janeiro O GLOBO in Portuguese
25 Jan 89 p 16

[Text] Brasilia—President Jose Sarney yesterday, in opening the first meeting of the Higher Council of Nuclear Policy (CSPN), reaffirmed the pledge of the Brazilian Government to use nuclear energy only for peaceful purposes. He announced that the new national nuclear energy policy, which is to be sent to Congress in March, will be drafted in the light of this principle.

The meeting was attended by 16 ministers of state, scientists, and members of Parliament. During the meeting, Sarney asked them all to support the new policy. He emphasized that technological development is fundamental for maintenance of and balance in cooperation between nations.

"Thanks to the support which the government gave to this sector, Brazil's scientists and engineers, through their own efforts, gained mastery of the technology of uranium isotope development and built the first entirely Brazilian nuclear reactor. The country is getting ready to move into the 21st century with the conditions for enjoying the benefits of nuclear technology in medicine, agriculture, industry, and energy production," he said.

The president stated that Brazil opted "with sovereignty for development, for putting an end to technological dependence, and for the efficient utilization of human and natural resources."

He stressed cooperation between Brazil and Argentina in the nuclear area and explained that the establishment of the CSPN is in keeping with the need for the unification of doctrine and thinking in the nuclear energy field. Starting in August, the council, according to Sarney, will play an important role in the pursuit of nuclear policy.

Following the speech by President Sarney, physicist Jose Goldenberg, engineer Jair Carlos Mello, and physician Luiz Renato Caldas were sworn in as members of the CSPN for a term of 3 years. Among the ministers of state involved in the council meeting, only Oscar Dias Correa, minister of justice, did not attend.

Final Site for Radioactive Waste From Goiania

The final report prepared by the Consultive Commission for Nuclear Waste, delivered yesterday to the Higher Council of Nuclear Policy, proposes that radioactive waste from Goiania, temporarily stored in the Abadia de Goias dump, be transferred to a final dump at the state border. The commission established technical criteria for locating

this dump and noted that there are various areas in Goias that are suitable for radioactive waste storage without risk to the population or the environment.

The Higher Council of Nuclear Policy will analyze the commission's suggestions and, within 45 days, is to send to the Congress a bill containing the technical criteria to be adopted for the construction of deposits. The definition of the areas where the deposits will be built is a job for the CNEN (National Nuclear Energy Commission) which will select areas only after the bill has been passed by the Congress.

In its report, the Consultive Commission also proposed that intermediate deposits for storage and processing be built in the states originating the waste.

Also assessed was the progress being made in the atomic sector cooperation agreement between Brazil and Argentina, which was considered to be satisfactory. In addition to the ministers, the meeting was attended by Rex Nazare, chairman of the CNEN; Jose Guilherme Camargo, president of the Brazilian Nuclear Energy Association; and Jose Valter Pelico, chairman of the Consultive Commission for Nuclear Waste.

Angra III Completion Sought

51002046 Sao Paulo O ESTADO DE SAO PAULO
in Portuguese 26 Jan 89 p 9

[Text] The government will not only complete the construction of the Angra II and Angra III nuclear power plants but will also build a fuel element factory where it will process the enriched uranium to be produced in the Navy installations in Aramar. Brazil wants to guarantee self-sufficiency in this type of uranium. To justify construction of the factory, it is necessary to complete Angra III by whatever means. This is what was heard at the meeting of the Higher Council on Nuclear Policy held in Brasilia on Tuesday, with 17 state ministers in attendance. This was the council's first meeting, at which the three nongovernmental members were sworn in: Jose Goldemberg, Luiz Renato de Caldas, and Jair de Mello.

During the meeting, the administration's representatives—with the exception of those from the economic area—displayed great enthusiasm and determination with regard to the entire nuclear program, including the parallel program, independently of the problems with the World Bank (IBRD). They believe that the administration's retreat—even before it was decided not to provide information and now including commissioning an economic viability study for Angra III—will permit the release of the \$500 million loan from the IBRD which has been holding up all of the other loans already firmed up with the international banks in the context of the foreign debt renegotiation accord. Brazil wants to prove that it would be uneconomical not to finish the plant, because it would have to pay fines estimated at \$250 million to the German suppliers. According to

studies prepared by Furnas and Eletrobras [Brazilian Electric Power Companies, Inc.], the difference in the cost of Angra III and of a hydroelectric power plant of the same capacity, that is, 1.2 million kilowatts, is only 25 percent. The IBRD has already received the studies and sent a mission, now in Brazil, to evaluate them.

Atomic Brazil

During the meeting, Rex Nazareth, chairman of the National Nuclear Energy Commission, reported on the results obtained so far from the parallel program which will permit Brazil to enrich uranium through a process of its own. But he did not make clear why it is necessary to finish Angra III in order to make the construction of an industrial processing factory economically viable through more of this parallel program.

In addition to the military ministers, one of whom was very enthusiastic about the nuclear program, President Jose Sarney spoke in support of the development of a joint effort with Argentina. He also thinks in terms of uranium reprocessing and made it clear that he is not dropping the idea of developing the full Brazilian nuclear program.

CUBA

Visit of Soviet Atomic Power Official Reported

Meets With Vice President

*FL1602141589 Havana Tele-Rebelde Network
in Spanish 1200 GMT 16 Feb 89*

[Text] Jose Ramon Fernandez, vice president of the Council of Ministers, received Vadim Mikhailovich Malyshev, chairman of the USSR State Committee for Safety in the Atomic Power Industry.

During the meeting, which was also attended by Fidel Castro Diaz-Balart, executive secretary of the Atomic Energy Commission, the officials talked about matters of interest for cooperation in the field of atomic energy safety supervision.

As part of the activities of Malyshev and his delegation, the Soviet group visited various centers of scientific and technical interest and the child care center "Little Friends of the Atom."

Tours Nuclear Power Plant

*FL1702142489 Havana Tele-Rebelde Network
in Spanish 1200 GMT 17 Feb 89*

[Text] Vadim Mikhaylovich Malyshev, chairman of the USSR's State Committee for Safety in the Atomic Power Industry, and Fidel Castro Diaz-Balart, executive secretary of the Atomic Energy Commission of Cuba, have toured various projects under construction at the Juragua nuclear

power plant. They were accompanied by representatives from the Basic Industry and Construction Ministries and the nuclear sphere's institution system.

Malyshev and the delegation accompanying him participated in an exchange of views. Each group responsible for the construction of the projects noted, among other things, the efforts being made to maintain quality during the entire investment process and the improvement of coordination of on-site safety inspection teams in line with Decree-Law 98 in effect in our country.

Signs Nuclear Safety Agreement

*FL1802184089 Havana Tele-Rebelde Network
in Spanish 1800 GMT 18 Feb 89*

[Text] Vadim Mikhaylovich Malyshev, chairman of the USSR's State Committee for Safety in the Atomic Power Industry, and Fidel Castro Diaz-Balart, executive secretary of the Atomic Energy Commission of Cuba, have signed an intergovernmental agreement that regulates Soviet technical assistance to our country in the field of the state's safety supervision at the Cienfuegos nuclear power plant and other nuclear projects under construction. The document establishes, among other things, the supply of advisers and laboratory equipment and training of Cuban personnel for state supervision organs.

Meets With Castro

*FL2002173489 Havana Tele-Rebelde Network
in Spanish 1200 GMT 20 Feb 89*

[Text] Commander in Chief Fidel Castro, president of the Council of State and Cuban Government, met on Friday night with Vadim Mikhaylovich Malyshev, president of the USSR's State Committee for Safety in the Atomic Power Industry.

Malyshev conveyed his impressions of the work our country is undertaking in the area of the peaceful use of nuclear energy. He stressed the integral concept of Cuba's [words indistinct] and the seriousness that the [word indistinct] and the PCC's stand on matters related to the safety of nuclear installations.

During the course of their negotiations, the leaders positively assessed the quality of the work at the Juragua electronuclear center.

The commander in chief also expressed an interest in the current situation and in new measures being taken in the USSR to guarantee the safety of nuclear projects.

Also present at the meeting were Mikhail P. Alekseyev, chief of Soviet advisers in the nuclear safety area; Fidel Castro Diaz-Balart, executive secretary of the Cuban Atomic Energy Commission; and Alejandro Bilbao Alonso, principal state inspector for nuclear and radiological safety.

INDIA

Government Spokesman Comments on Pakistani Bomb Progress

5150065 New Delhi PATRIOT in English
14 Jan 89 p 6

[Text] India is aware that China has been providing help to Pakistan in its development of a nuclear device. The Government, however, was checking on the reports.

An official spokesman said on Friday, that India is concerned about the development of a nuclear device by Pakistan. India's stand is well known on this issue, the official spokesman added.

In reply to a question about the possibility of Pakistan testing its nuclear device in China, the spokesman said, we have no evidence that this particular test is taking place in China.

Agencies add: The report from London quoting western intelligence source said the sources had conclusive proof that Pakistan has overcome difficulties in making nuclear bombs and delivering them through American F-16 bombers. They believe that China is arranging a nuclear test for Pakistan at its Lop NUR testing ground shortly to test whether the Pakistani bomb works as intended. The head of Pakistan's Kahuta nuclear plant, Dr Abdul Qadar Khan, visited China in November last year to discuss preparations for the test, the report said.

According to the report, the plans are likely to be finalized during Pakistan Prime Minister Benazir Bhutto's visit to China later this month.

China tested its nuclear bomb in 1966.

The test on the Pakistani bomb is likely to be carried out from a tower or from an underground site, the report said.

The reports said western sources believed that despite Ms Bhutto's assertion that Pakistan had no desire for nuclear weapons, Pakistan was going ahead with their production. Ms Bhutto's capacity to influence Pakistani nuclear policy is doubted in western circles.

Consequences of Pakistani Nuclear Program Noted

BK2702143489 Delhi PATRIOT in English
10 Feb 89 p 4

[Article by Cecil Victor: "Meaning of Pak Weapons Disclosures"]

[Text] Besides the throw-weight and range of the missile and the yield of the nuclear arsenal that Pakistan has acquired it is necessary to understand why confirmation of the fruits of its clandestine activities should come from none other than Washington, which has been

giving the regime in Islamabad a good conduct certificate over the past decade. Certain geostrategic games are about to be played out shortly and it is unlikely that India is going to come out of it with flying colours.

The release of President Ronald Reagan's letter to House of Representatives Speaker Jim Wright, the contents of which clearly betray U.S. knowledge of the extent and direction of the Pakistani nuclear programme, is a demarche intended to serve warning on India that it must now begin to take the necessary steps to allow the U.S. game-plan for the region to be implemented. Pakistan, with an operational nuclear weapon (just two screwdriver turns away—no need to test it because all parameters have already been proved in tests by China in the improvement of its own nuclear arsenal) and the ability to deliver it (both with aircraft and missiles), is now ready to talk business.

All but the very naive in India (and those who have been playing the U.S. game) were sure that there would come a time when Pakistan would finally admit that its nuclear programme was in reality a weapons development project. That moment has arrived and it is significant that it should coincide with the advent of a Bhutto at centre-stage in Islamabad. After all it was her father who set Pakistan on the nuclear weapons path, vowing that his countrymen would eat grass but have the bomb. As it turns out Pakistan is going to eat its cake and have it too.

For long the U.S. government certification that Pakistan does not have nuclear weapons capability was backed with several billion-dollar packages of conventional state-of-the-art weapons like the F-16 fighter-bombers, Stinger missiles, preemptive electronics and tanks on the excuse that a bloated arsenal would boost Pakistan's confidence vis-a-vis India enough to force it to abjure nuclear weapons.

It was a thinly-disguised plot and today the facade has been dropped like Salome's seventh veil leaving bare the fact that Islamabad now has a formidable conventional capability to complement the bomb in the basement, which by my calculation is as yet only aircraft deliverable (in a pinch which may not come because India is not about to match it screw for screw) but it can soon be converted to missile delivery with a little help from China, the U.S. and its NATO allies who have severally contributed to the gradual accretion to Pakistan's programme knowing full well that its clandestine acquisition of strategic materials points only in one direction. China's direct contribution would be in the sphere of miniaturisation of the warhead to fit it to a missile thereby making it cost-effective and difficult to intercept (unlike an aircraft) and giving it a true strategic value.

Reagan's missive to Jim Wright is, to borrow a Kissinger term, a truly elliptical way of telling the world that the U.S. has known all along the intent and purpose of the Pakistani programme; that the certification (mandatory under the Symington amendment which requires of the

U.S. Government to give an undertaking to Congress that the recipient of U.S. military and economic assistance is not pursuing a nuclear weapons policy) was a ploy to enable a partner in the strategic consensus (with China in South Asia) to attain all the trappings that would enable it to fulfil its assigned role in the region.

It is no accident, therefore, that the Pakistani ambassador in Washington should brazenly admit that his country can cross the "threshold" whenever it wants. The calculation apparently is that the developing situation in Afghanistan would make it extremely unpopular for the Bush Administration to veto aid to Pakistan at this juncture and enable him to issue a waiver just as Reagan did (for the same reasons) during his tenure. The game-plan begins to unfold.

Now that Pakistan has announced that it has nuclear weapons capability (though it says it will not make the bomb), pressure is going to be applied on India to come to terms on the Kashmir issue. Pakistan's strategy (endorsed by the U.S. and China as part of their perspective plan for the region) is to secure a settlement (for the time being) on the maintenance of the status quo in Kashmir, that is, that the two countries formally agree that each enjoys sovereignty over that part of Kashmir under its control. "For the time being" because there is no guarantee that Pakistan will not encourage Kashmir Liberation Front extremists to intensify insurgency in the Valley to try and secure its merger with Pak-occupied "Azad" Kashmir. Also, there is no guarantee that, just to spite India, Pakistan will not give "independence" to Azad Kashmir knowing full well the repercussions across the line of actual control.

That this is the general strategy for the region was evident from published U.S. maps which showed the whole of Jammu and Kashmir as part of the "area of concern" of the U.S. Central Command (CENTCOM) whose military tentacles would reach beyond Gwadar naval base and Karachi to Peshawar and Gilgit via Skardu. The last-named has long been part of the strategy to show actual control of Kashmir through alpine expeditions to the Himalayan peaks in northern Kashmir—a manoeuvre which alerted Mrs Indira Gandhi to the grand design and she ordered the induction of Indian troops onto the Siachen Glacier to prevent any further land grab.

The almost simultaneous announcement of nuclear weapons capability and the missile test will trigger off the following scenario: Pakistan will flaunt its "threshold" status and begin to make diplomatic demands of India with regard to Kashmir (this has already begun). There will be a lot of "double speak" with regard to Pakistani assistance to the Khalistani and the Kashmiri extremists (this too has begun with Pakistan's refusal to accept joint patrolling of the border under a unified command).

The U.S. will mount pressure on India to hold more dialogues with Pakistan for peaceful solutions to bilateral problems. The whole exercise will be to maintain the

status quo in Kashmir. Simultaneously, pressure is being applied by pro-U.S. Indians to buy peace in the region by allowing the concept of status quo to prevail.

There have already been some preposterous suggestions for the creation of a no-man's-land along the line of actual control and retired military personnel have begun cribbing about the high cost and difficult terrain of the operations on the Siachen Glacier.

Not long ago the official media, Doordarshan, announced that so far as India is concerned the Kashmir issue is settled. The bald announcement did not clarify how it came to such a conclusion but the Government by its failure to take appropriate action to dispel the impression created by the Doordarshan news confirms the suspicion that it was a calculated exercise in opinion control by subliminal methods.

Given the neutralisation of its predominant strength in conventional weaponry (though this can be negated by appropriate measured responses to Pakistan's nuclear weapons programme); the appearance that the Government of India is buckling under external and internal pressure to come to terms with Pakistan on its conditionalities makes it easy to understand why the U.S. is confident of "turning India around" to an acceptance of its perceptions in the region.

That the U.S. has planned its moves far into India's end game is apparent from the steady accretion of conventional weaponry to Pakistan. The proposed package of over \$4 billion in the early 1990's is designed to take care of any Indian attempt to neutralise the Pakistani nuclear strategy and return the equation to a more favourable conventional level by first matching Pakistani's nuclear trump; that and the emerging arms supply network within the region. Little wonder, then, that Pakistan is looking forward to having its nuclear cake and eating it too.

Gandhi Rules Out Any More Nuclear Submarines
BK1602160689 Delhi Domestic Service in English
1530 GMT 16 Feb 89

[Text] The prime minister, Mr Rajiv Gandhi, has reiterated the country's nuclear program is entirely peaceful. Talking to newsmen after witnessing 3-hour-long naval exercises somewhere in the Arabian Sea today, Mr Gandhi said the nuclear-powered submarine INS [Indian naval ship] Chakra was acquired only for training purposes. He was replying to a question about the Pakistan prime minister, Mrs Benazir Bhutto, singling out India's acquisition of the submarine during her talks with the Chinese leaders.

When asked whether more such submarines will be acquired, Mr Rajiv Gandhi replied with a categorical no.

Earlier, addressing the officers and sailors of INS Virat, Mr Gandhi asked them to watch the increasing tension in the Indian Ocean and guard the over 2 million square kilometers of the exclusive economic zone. He said the Navy will have to play a major role in this task.

In a message to the chief of naval staff, the prime minister said it was most satisfying to see Indian Navy in action at sea. The clockwork precision and skill with which the exercises were carried out is a tribute to the Navy's professional excellence as guardians of our maritime frontiers.

Bangalore Meeting Discusses Safety in Nuclear Plants

AEC Chairman, Others Speak

51500063 Bombay *THE TIMES OF INDIA* in English
12 Dec 88 p 6

[Text] Bangalore, December 11—The chairman of the atomic energy commission, Dr M.R. Srinivasan, today hinted at the Centre setting up a reprocessing plant at Kalpakkam for the spent fuel from the nuclear power plant there.

Participants in the discussion on "safety measures in nuclear plants" on the second day of the national workshop on "nuclear power projects with special reference to Kaiga" here, Dr Srinivasan, who is also secretary to the atomic energy department, said the spent fuel at the Kalpakkam project was at present being transported to the Tarapur plant.

However, the commission had not taken any decision for reprocessing the spent fuel from the Kaiga project, he stated.

Answering questions on the evacuation of the local people in the event of any emergency, Dr Srinivasan said a regional safety committee, generally headed by the chief secretary of the respective state where any nuclear power plant is located, was to be constituted.

The committee was expected to educate the people on radiation and make arrangements in the event of a disaster. He pointed out an emergency zone of 16 km radius had been marked around at the proposed project.

"However, nuclear radiation is not a prompt killer and this has been seen at the Chernobyl disaster." The Soviet government took one-and-half-days to take a decision to evacuate the people from the accident spot and though it took four to five days to evacuate all, the radiation exposure was small, Dr Srinivasan claimed.

He also clarified that the government had no intention of mining uranium at Kaiga as it was not economical. On the danger posed to the nearby Kali dam, Dr Srinivasan said a survey had revealed that the dam had been constructed to modern standards and there was no threat to it.

Mr A.K. De of the atomic energy research board said the selection of the site for locating any nuclear power plant did not come under the purview of the board. But it was called upon to provide engineering consultancy. The board was yet to give any authorization to the Kaiga project, he added.

Mr Champa, the president of the fishermen's association at Karwar expressed the fear that the nuclear radiation would affect the fish in the Kali river.

Writers Plea

The noted Kannada writer, Dr K. Shivarama Karanth, urged nuclear scientists not to go ahead with the Kaiga atomic power project as the people fear a nuclear holocaust.

An emotional Dr Karanth, who chaired the third session of the workshop said: "As long as the people have the fear, the scientists should permit them to live in peace and in an environment free of danger."

Referring to the speeches of the scientists on the safety of atomic power plants, Dr Karanth said he was not ready to believe those "tall claims" as reality had proved that scientists could be wrong.

He said a fissure in the Supa dam had been recorded by a satellite picture, though scientists did not reveal the truth to the people. He said Kaiga was an earthquake prone area and hence the danger was more in building an atomic plant there.

The Bhabha Atomic Research Centre (BARC) director, Dr P.K. Iyengar, said the design of the Kaiga plant was different from others. The safety aspect had been given adequate importance and the reactors were designed to avoid accidents and release of radioactivity into the atmosphere, he said.

He pointed out the planet earth itself is a nuclear waste and the people are living in a sea of radioactivity. A disaster management committee had been set up by the government to look into the aspect of mishaps, he claimed.

The resident editor of *THE TIMES OF INDIA*, Bombay, Mr Darryl D'Monte, observed that unequal energy usage patterns in the country had a parallel in the literacy scene. He noted that 50 per cent of the energy produced in the country was used in cooking. About 20 per cent of the plan outlay was for the energy sector, he pointed out.

Prof T. Shivaji Rao of the environmental engineering department in Andhra university, said evacuation of people in case of accidents in Kaiga would be difficult as the government did not have the adequate infrastructure.

He asked the union government to bring in a legislation, similar to the Prince Anderson Act of the United States, which provided for those affected by nuclear radiation in the normal course.

The convenor of citizens against nuclear energy (CANE), Mr Nagesh Hegde, said the flora and fauna in the Kaiga region was fast depleting and the plant might endanger them further.

Earlier, speaking about radiation effects on living systems, Dr Devanayakam said data available from 1970 revealed several workers in the Kalpakkam power plant received 30,000 millirems of radiation in one year, while the acceptable limit is only 5 millirem. He said 112 were found infertile out of the 3,794 couples and ten congenital deformities had been recorded among the children born to the workers.

No Assurances Given

51500063 Madras THE HINDU in English
12 Dec 88 p 4

[Text] Bangalore, Dec 11—The two-day debate on the proposed Kaiga nuclear power plant in the Uttara Kannada district of Karnataka ended here this afternoon disappointing the vocal anti-nuclear power plant lobby. The lobby failed to secure an assurance from the Minister for Urban Development, Mr R.V. Deshpande (who hails from the district), that the Government would suspend preliminary work on the Kaiga plant pending a final decision.

The environmentalists met for a few minutes after the concluding session of the debate to adopt a resolution that there should be a moratorium on all nuclear power projects and that the Kaiga plant was redundant. The Atomic Energy Commission should provide information on all the nuclear power plants to the citizens, it demanded.

Earlier a vain bid was made to have one of the representatives of the environmentalists group make the concluding remarks along with Atomic Energy Commission Chairman, Dr M.R. Srinivasan. The Minister who handled the vociferous anti-Kaiga group with some deftness allowed only Dr Srinivasan to make the concluding remarks as had been scheduled.

Compulsions: Mr Deshpande noted that the circumstances had compelled the State Government to consider the option of nuclear energy. The hydel projects had their own limitations and in fact all the developmental projects taken up in the Western Ghats would have their impact on the ecology of the region.

Mr Deshpande wanted nuclear power plants to be brought under the purview of the Environment Protection Act passed after the Bhopal gas tragedy. The veil of secrecy about nuclear projects should be removed by amending the Atomic Energy Act of 1962. The Act empowered the chairman of the commission to hold back information even from Parliament. He was answerable only to the Prime Minister.

After the debate concluded, some of the environmentalists were locked in a heated argument with the Minister. Outside the main gate of the Indian Institute of Science (the debate was held at the faculty hall of the institute) some of the anti-Kaiga activists, especially those carrying placards, had been stopped by the police.

In his concluding remarks, Dr Srinivasan said the country should take pragmatic decisions and not be carried away by fears or emotion. Karnataka, he noted, would be faced with energy problem for long. He said there would be no mining of uranium in Karnataka. About the safety of nuclear power plants, he noted that those in Armenia (Soviet Union) and Bulgaria had withstood the recent devastating earthquake in that region.

The nuclear energy programme received indirect support from Prof P.N. Srivatsava, member of the Planning Commission. He spoke of how the country lost the opportunity to develop solar energy amidst criticism in the fifties. It was Prof K.S. Krishnan of the National Physical Laboratory who had launched the research project to develop it. The project was abandoned.

Prof Srivatsava made it clear that solar, wind or biogas could not solve the energy problems of the country. He told the environmentalists that they were not prepared to accept the problem of pollution posed by the thermal plants.

Atomic scientists criticized: Lending strong support to the anti-nuclear power plant lobby, Prof Dharendra Sharma of the Jawaharlal Nehru University criticized the atomic scientists for alleged failure to educate the people on the Chernobyl and the Three Mile Island accidents. Scientists who questioned the safety aspect of nuclear power plants were being eased out of the Atomic Energy Commission. The late Prof D.D. Kosambi was forced to quit the Tata Institute of Fundamental Research in the early sixties for opposing the nuclear power programme.

Safety Precautions at Nuclear Power Plants Described

51500072 Madras THE HINDU in English
16 Dec 88 p 2

[Text] Madras, Dec 15—Each nuclear installation in the country has a series of safety committees, and they include workers, engineers, scientists etc. who are provided with hands-on experience so that no aspect of

safety is lost and the reports are sent to the Atomic Energy Regulatory Board (AERB), according to Dr N. Srinivasan, former Member, Atomic Energy Commission (AEC).

Dr Srinivasan, who was speaking on "Safety in India's Nuclear Energy Programme, said in today's context, there could not be a more independent organization than the AERB in its operational autonomy and professional linkages. It did not report to the Department of Atomic Energy (DAE) or to the Chairman of the AEC but to the AEC as a body. It had among its members, a medical doctor, a scientist and an engineer familiar with power generation.

The talk was organized by the Indian School of Social Sciences, Madras, and the Tamil Nadu Science Forum.

Besides, engineered safety aspects, every nuclear installation in the country had an exclusion zone of about 1.5 km and a sterilized zone of five km. Stay-in emergency and site-emergency drills were recently conducted at Tarapur, Rajasthan and Kalpakkam Atomic Power Stations because the public had shown an awareness of nuclear energy and were able to absorb the information disseminated. The ultimate aim of these exercises was to conduct full-fledged trials, find out the inadequacies and rectify them.

Dr Srinivasan said there was so much of redundant safety in the designing of nuclear power stations in India that it accounted for 30 per cent of the cost of a nuclear power reactor. The discharges at the Tarapur Atomic Power Station (TAPS) and the Rajasthan Atomic Power Station (RAPS) were never above the limits prescribed. Every person who was exposed to radiation carried a dosimeter, whose data was the property of the individual and the radiation data was available to him every 15 days.

From the mean average in the past, every case was investigated on whether it was genuine and whether the records bore out the final exposure of radiation. And there had been no authentic technical and scientific information validating the various concerns on serious effects of radiation on genetics. "There has been no complaint to my knowledge" on the effect of radiation on genetics when more than 10,000 personnel had worked over a period of generation in India's nuclear installations, he said.

"I cannot conceive of any radiation escaping at any point of time from Kalpakkam," Dr Srinivasan said.

Soviet-designed reactors: On the two Soviet-designed VVER type of nuclear reactors of 1,000 MW capacity each to be installed at Koodankulam in Tamil Nadu, he said the VVER was one of the safest forms of pressurized water reactors. It was very close to the recent French version of pressurized heavy water reactor and the French performance had been very good. He pointed out

that the nuclear power station at the earthquake-devastated Armenian in the USSR had not suffered any damage but the USSR had decided to shut it down taking into account the sensitivity of the people.

In Indian nuclear installations, pregnant women were not allowed to work in radiation zones. Children below 18 years were also not allowed entry. Until 100 families living on the periphery of the exclusion zone of the TAPS were vacated and rehabilitated, the Health and Safety officials refused to give clearance to the project.

Japan, which was exposed to uncontrolled release of nuclear energy (Hiroshima and Nagasaki) had gone in for a massive programme of nuclear power and it had nuclear power stations all along its coast.

Unfortunate connotation: Mr N. Ram, Associate Editor, The Hindu, who presided, said people "taking a philosophical stand against nuclear power in the Indian context is an unfortunate connotation in an energy deficient country and projections are being made on an unrealistic basis that do not respond to real-life situation." A target of 10,000 MW of nuclear power had been set for 2,000 A.D. but it seemed beyond reach as far as indigenous effort was concerned. Hence, the switch in policy to import two Soviet VVER reactors of 1,000 MW capacity each, which would use enriched uranium as fuel and light water as coolant and moderator, was welcome.

But it was "deplorable" that instead of looking at the issue objectively, attempts had been made to invoke the horror of Chernobyl accident. The emotive aspect should not be used to cloud and color the issue. The issue of safety should not be used "to serve your philosophical stance against nuclear power," Mr Ram said. "Don't mix up issues, deal with them on merits," he added. India's nuclear power venture had a smooth sailing till late 1970s but today the situation was somewhat divided. Some people were not farsighted enough to see the energy deficiency that would be in store.

Mr Ram also said the U.S., vis-a-vis TAPS, adopted the stand at some point that as a supplier of low enriched uranium, it had the right to dictate the policy on India's entire nuclear activity front and virtually tried to "blackmail" India. But the USSR had never attempted to twist India's arms using its supply-relationship leverage.

Dr T. R. Govindarajan of Loyola College said out of 420 nuclear reactors in the world, 50 per cent were of the VVER type of reactor to be erected in Koodankulam. As many as 119 reactors were being built all over the world now and they would produce one lakh MW of power. The nuclear power accounted for 50 per cent of electricity production in France. Over the years, confidence had been built in the radiation limits prescribed by the International Commission for Radiation Protection.

Mr V. Murugan, Secretary, Tamil Nadu Science Forum, Madras unit, welcomed the gathering.

Campaign Against Soviet-Aided Nuclear Plant Unfolds

SI500069 Madras THE HINDU in English
24 Dec 88 p 10

[Text] Tirunelveli, Dec 23—The campaign against the proposed Koodangulam nuclear power plant is gaining momentum in Tirunelveli and Kanyakumari districts, aided in part by the absence of any propaganda to counter it either at the political or the administrative level or apparently due to the coming Assembly elections.

A motley assortment of organizations, including fishermen's associations and the Catholic clergy, the All-India Catholic University Federation (AICUF), the Samathuva Samuthaya Iyakkam (SSI) and the Indian Peoples' Front (IPF), have been making a concerted bid to rouse public consciousness against the project, under which two nuclear reactors of 100 MWe capacity each are proposed to be installed with Soviet aid.

Students in the fray: A disturbing development is the agitation launched by students of several colleges in Tirunelveli and Kanyakumari districts in the past few days against the project.

The Samathuva Samuthaya Iyakkam organized a procession in Tirunelveli on Monday, attended mostly by fishermen from the coastal hamlets. The processionists took an oath at the end of the rally outside the Collectorate here that they would not permit the construction of the power plant.

While the rally, at the end of which some Catholic clergy spoke, showed that the anti-nuclear lobby had made some impact on the fishermen, it also showed that the SSI's campaign had made little dent among the people of the hinterland, who need the project badly.

Anti-PM plant: For the Indian Peoples' Front the issue was but a ruse for launching its anti-Rajiv Gandhi campaign. Believed to be a political arm of the CPI(ML), the IPF came to notice here when it put up banners during the visit of the Prime Minister to this district, denouncing him and demanding his resignation. In its posters, it lambasts the Soviet Union also for assisting in establishing the plant and describes it as a "conspiracy of hegemonists." The public meeting the Front organized in Tirunelveli at the conclusion of its rally did not evoke much public response.

Interestingly, the SSI leader, Mr Y. David, who was also in town that day, did not speak either at the conclusion of the cycle procession or share the IPF platform, indicating that the anti-nuclear lobbyists were yet to form any alliance.

Questioned by correspondents here about the motives for starting the campaign, Mr David said that his organization had been working for the uplift of people from the unorganized sector like fishermen, quarry and tannery workers and palmyrah tappers and he also wanted to project environmental issues. When a newsmen asked him why he did not highlight the danger of atmospheric pollution caused by a cement plant near Tirunelveli or the pollution of the Tambaraparani river, he did not come out with any convincing answer.

Source of funds: The source of financing of the SSI, which has been at its campaign for months with Valluvoor its base, has also been a subject of speculation. Mr David has employed about 15 persons to carry out propaganda and has a vehicle for use. When newsmen pointed out that it would require a lot of money and asked whether he was receiving money from abroad, Mr David said he was getting donations from the local people and the expenses were not high. He stoutly denied that there was any religious bias in his organization. Asked about a reported meeting of some priests belonging to different Church groups at Nanguneri, organized by him about three weeks ago, that decided to extend moral support to the campaign, but to keep away from participation in the campaign, Mr David said no such meeting took place.

Need for open debate: The SSI leader also countered the charge that he had a closed mind on the nuclear issue. He said he was willing to suspend the agitation if the Central Government came forward to put in cold storage its proposal to set up the nuclear plant and convince the people that it was cent [sic] per cent safe. There should be an open debate in which neutral scientists also should participate and the Government should convince the people that the plant was safe. The question of disposal of nuclear waste also should be satisfactorily answered, he said.

Swede's visit: When Mr David took a Swedish national having a tourist visa, Mr Lars Eric Anderhareklint, to the plant site and to the fishing hamlet of Indinthakare, the police detained the Swede and brought him to Tirunelveli. The Swede said that he was a student of environmental studies at Stockholm University and had entered the country on a three-month tourist visa.

Since Koodangulam was yet to be declared a protected area, the Swedes' actions have not attracted any punishment. He left for Madras yesterday.

Though the Atomic Energy Department had sent some of its scientists to meet the local people and religious leaders informally to gauge the people's mood and understand their fears, Atomic Energy Commission has not so far organized any seminar to educate the people on the project.

The process of initiating the preliminary steps for the project has however been set in motion. A six-member group of Soviet project economists from an organization which is the Soviet counterpart of India's Nuclear Power Corporation (NPC) held discussions with the Tirunelveli Collector, Mr M. Raman, on Tuesday on the various taxes levied in the area. The team, accompanied by Mr Mangalani and Mr Prabhakaran of NPC, Bombay, visited the project site on Wednesday.

Light Water Leak Shuts Down Rajasthan Nuclear Plant

51500068 Bombay *THE TIMES OF INDIA* in English
8 Jan 89 p 5

[Text] Bombay, January 7—Unit-I of the Rajasthan Atomic Power Station has been shut down following the reappearance of light water leak from the end shield of the reactor on December 30.

Investigations to detect the source of the leak will begin from January 9, after the expiry of the cool down period. Further course of action will be decided only after this investigation, according to a spokesman of the Department of Atomic Energy. If the leak was from one of the existing plugs, the unit could be brought on line after repairs within a short time. Should there be a fresh leak, the situation would be beyond immediate redemption.

RAPS unit-I had light water leak in the south end shield at inaccessible locations and after many years of closure, the unit was recommissioned in August, 1987. Plugging of the leaks posed a major challenge to the authorities as similar work had not been carried out anywhere else in the world so far.

The unit was operating smoothly at 90 MW against the original 2.5 MW capacity till December, 1987. After affecting some improvements to the leak plugs, the unit was started again in January, 1988. The DAE spokesman said the unit was performing satisfactorily and it generated 472 million units in 1988.

The second unit at RAPS was performing well and it generated 1400 million units with a capacity factor of 31 per cent in 1988. This unit is scheduled for annual maintenance shut down for eight weeks in February, 1989. The exact date of the shut down is yet to be decided.

Atomic Power Plant in Kalpakkam Shut Down

BK2502035689 Delhi Doordarshan Television Network
in English 1600 GMT 24 Feb 89

[Text] The 235-mw first unit of Madras atomic power plant, Kalpakkam, was shut down today following the detection of heavy water leakage. The project director, Mr Rangarajan, told an All India Radio correspondent that the leak was noticed yesterday. However, the unit was allowed to run in order to make it easy for the Tamil

Nadu electricity board to make suitable adjustments in power distribution. The unit was onstream 15 days ago after its 2-month annual shutdown.

New Ion Accelerator for Tata Research Institute

51500061 Bombay *THE TIMES OF INDIA* in English
29 Dec 88 p 6

[Text] Bombay, December 28—The annual nuclear physics symposium of the department of atomic energy, being held at the Bhabha Atomic Research Centre (BARC) here for five days from yesterday, commemorates the 50th year of the discovery of nuclear fission.

A notable event during the symposium will be the inauguration of the pelletron accelerator facility set up at the Tata Institute of Fundamental Research (TIFR) here on Friday.

The medium energy heavy ion accelerator facility, jointly set up by TIFR and BARC, is based on a tandem Van de Graaff accelerator with terminal voltage going up to 14 million volts. Starting from proton it can accelerate any ion across the periodic table. The protons and alpha particles can be accelerated up to energies of 28 MeV and 42 MeV and other heavy ions to even higher energies, depending on the charge state of the stripped heavy ion.

This is the first accelerator facility in the country to accelerate heavy ion beams to sufficiently high energies needed for advanced research in nuclear physics. A variety of experimental facilities have also been built to pursue research programmes with this facility, in newly-emerging areas such as nuclear physics as nuclear structure at high angular momentum, scattering and reactions and fusion-fission.

The facility will also find applications in research in atomic physics, chemistry and solid state physics.

Dr P.K. Iyengar, director of the BARC, who inaugurated the symposium yesterday, cited various examples where nuclear physics had been used for applications in medicine.

Prof Virendra Singh, director of TIFR, Dr S.S. Kapoor, associate director of the physics group, BARC, and Dr R. Chidambaram, director of the group, spoke. Dr D.M. Nadkarni proposed a vote of thanks.

Conference on Nuclear Reaction Mechanism Opens

51500073 Calcutta *THE TELEGRAPH* in English
4 Jan 89 p 2

[Text] Calcutta, Jan 3—The chairman of the Atomic Energy Commission, Dr M.R. Srinivasan, today reiterated the need for developing nuclear energy in the country despite strong opposition from various quarters.

He said safety standards, radiation and waste disposal linked to nuclear power are complex problems for which "solutions are also available" and "we cannot get emotional on these issues."

Dr Srinivasan was speaking at the inauguration of a six-day international conference on nuclear reaction mechanism organized by the Saha Institute of Nuclear Research and Variable Energy Cyclotron Centre, at Bidyut Bhavan in Salt Lake this morning.

The chairman's staunch advocacy of a pro-nuclear energy policy for India followed an unprecedented demonstration, organized by the city-based People's Science Coordination Committee, outside the venue gates. The protesters shouted anti-nuclear slogans and noted dramatist Badal Sarkar and street theater troupe, Satabdi, staged skits on the theme.

The 70-odd demonstrators caught the attention of the 230 delegates, including 80 from foreign countries, attending the conference. Mr. Sarkar's troupe staged two anti-nuclear skits, Boma and Tringaha Satabdi, highlighting the horrors of Hiroshima-Nagasaki.

Mr Sarkar announced that the demonstrators were "against the holding of the seminar." He said this is the first time he was staging a street play outside the venue of an international conference. The troupe half-an-hour later put up a flower-bedecked sign reading, "Spare us atomic death."

Referring to the demonstration, Dr Srinivasan said, "I have seen the happenings outside and heard the slogans. I am aware that many scientists from other countries are beginning to question the need for nuclear power development. What is not understood, however, is that India is a country of 800 million people and a large part of our power comes from wood. Resultantly, our forest cover has declined from 40 per cent to less than 10 per cent today."

Dr Srinivasan warned, "If we go on like this, there will be no trees left in the country." Stressing the need for nuclear energy, he said wood must be "quickly replaced" as a fuel source with coal and coal replaced with nuclear power.

The "dangers of not having nuclear energy in the country are more than not having it," he said, adding that "from a distance, many energy options seem to be available," but reality was different. Admitting that "small is beautiful" was a tenable argument in the sphere of energy options, Dr Srinivasan hastened to add, "But India is not small and we cannot afford this argument." Though the per capita consumption of energy was less in this country compared to many others, India still needed an enormous supplement of energy, he concluded.

The director of the Bhabha Atomic Research Centre, Dr P.K. Iyengar, who inaugurated the conference, echoed Dr Srinivasan's sentiments. He explained that the growth of nuclear science was related to the growth of

technology and India "has to grow on the basis of its very strong and dedicated manpower." There were some unresolved problems, he said, before fusion power became feasible and therefore sustained nuclear research in the country was the need of the hour.

Earlier, Dr Srinivasan pointed out that research in the country was poised for a take-off with the commissioning of the 14 UD pelletron machine at TIFR, Bombay, and the setting up of a similar machine in Delhi. Others who spoke included the director of VECC, Dr Bikash Sinha, the director of the Saha Institute of Nuclear Physics, Mr M.K. Pal, Dr H.D. Holmgren of the University of Maryland, and Mr R.H. Siemssen of KVI, Groningen, the Netherlands.

Plutonium To Be Used as Fuel for Rajasthan Plant

51500067 Bombay THE TIMES OF INDIA in English
15 Dec 88 p 1

[Article by S. Kumar]

[Text] Bombay, December 14—India's nuclear power programme is entering a new phase with its path-breaking decision to use plutonium as a fuel at the Rajasthan Atomic Power Station.

With this, India will join a handful of nations in the world where plutonium, the most sensitive nuclear material, is being used in nuclear power reactors.

Having mastered the technology of mixed oxide (MOX) fuel, originally intended for the Tarapur Atomic Station, the Department of Atomic Energy has decided to use the fuel, a mixture of uranium oxide and plutonium oxide, in pressurized heavy water reactors in Rajasthan.

The MOX fuel plant, one of the largest plutonium handling facilities in the world, is ready for commissioning at Tarapur.

The indigenous plant will undertake trial production in the next three months and commercial production is scheduled to begin three months later.

The atomic energy regulatory board is currently inspecting the plant and its systems before issuing clearance for its operation, Mr P.R. Roy, director, materials group, at the Bhabha Atomic Research Centre here told THE TIMES OF INDIA today.

The plant can produce 20 tonnes of fuel per annum which will be adequate to fuel one unit of RAPS. It will handle 60 to 70 kg of plutonium per annum which is a huge quantity by world standards.

The significance of this technology will be clear from the fact that a speck of plutonium, as small as that of a pinhead if inhaled, can kill a person.

However, the sophistication of the plant is such that there will be no human contact with plutonium and the entire operation will be done through "glove boxes" and remote controls.

The reactors at Rajasthan and Madras now use natural uranium as fuel. In future, MOX will be introduced in these plants.

If one tonne of natural uranium was burnt, it would generate 5,400 MW of power. MOX fuel, on the other hand, will generate 10,000 MW. By using MOX, natural uranium can be saved up to 35 per cent.

Trees Used in Method of Prospecting for Uranium
51500066 Madras *THE HINDU* in English
13 Jan 89 p 10

[Text] Madurai, Jan 12—A geobotanist, Dr Ajoy Kumar Sen, from Asutosh College, Calcutta, said he has developed new methods of prospecting for uranium in the Singhbhum copper belt, in and around the Jaduguda mining area. Dr Sen has presented his claim in the geology and geography section of the 76th session of the Indian Science Congress.

His investigations have apparently shown that there exists a relation between the distribution of mineralized ground and of specific herbaceous plants. The distribution of these plants, according to him, is controlled by the presence of selenium and other trace elements available in the environment of the uranium deposit.

Also, it has been found that the uranium content of trees rooted in ore is significantly higher than that of trees elsewhere. To refine this geobotanical prospecting technique, information concerning the availability of ions in an ore environment and the absorption of these ions by plant species is important, according to Dr Sen.

In his experiment nearly 100 plant samples were analyzed for uranium and indicator plants have been mapped along a 100 sq.km. area. Plants that act as indicators of uranium ore have been found to be *astragalus allochrous* and *orezopsis lymenoides* which absorb selenium, while *pinus cembroides* (pinyon) and *juniperus monosperma* (juniper) trees absorb uranium.

The average uranium content in these trees growing in barren areas is 0.8 parts per million (ppm) compared to 1.80 ppm in mineralized ground sample.

Minister Opens Nuclear Science Center
51500071 New Delhi *PATRIOT* in English
20 Dec 88 p 5

[Text] Human Resource Development Minister Shiv Shankar on Monday launched the Nuclear Science Centre (NSC), an inter-university research facility put up at the Jawaharlal Nehru University campus by the University Grants Commission, reports UNI.

Speaking at the 'first day' function of the centre, the Minister said that nuclear science research in the country had so far been confined to the department of atomic energy and some other institutions supported by it, the new facility, he said, would provide new horizons of applications to the university scientists and scholars.

The Minister said the scientific community should undertake research to put India among leading nuclear power nations.

Mr Shiv Shankar said the National Electrostatic Corporation of the United States had since 1971 put up about 80 accelerators throughout the world. Of them, only three accelerators established at the U.S., Japan and Argentina, had higher terminal potential than the facility being established at NSC, India.

PAKISTAN

Indian Source Reports Bomb Ready for Testing
51500065 Bombay *THE TIMES OF INDIA* in English
13 Jan 89 p 1

[Article by K.N. Malik]

[Text] London, Jan 12—Pakistan has overcome difficulties in making the nuclear bomb and a delivery system through the American F-16 bombers.

Western intelligence sources, which claim to have conclusive proof in this regard, believe that China is arranging a nuclear test for Pakistan at its Lop Nor testing ground shortly. The test is to ascertain whether the Pakistani bomb works as intended.

The head of Pakistan's Kahuta nuclear plant, Dr Abdul Qadeer Khan, visited China in November last to discuss preparations for the test. The plans are likely to be finalized during the Pakistan prime ministers, Ms Benazir Bhutto's visit to China later this month. China tested its nuclear bomb in 1966.

After Pakistan acquired the design of a Chinese atomic plant and a small quantity of enriched uranium from China in 1983, Pakistani scientists, helped by the Chinese and some western technologists, made many changes in the design. Pakistan's bomb uses high-melting point explosive (HMX) and not the rapid detonation explosive (RDX).

HMX is considered safer. The method uses 25 per cent less HMX to cause the bomb's nuclear core to explode. The saving in space makes it possible to fit the device inside a bomb canister and carry it beneath the wing of a F-16 bomber.

The test on the Pakistani bomb is likely to be carried out from a tower or from an underground site.

The sources say that Pakistani air force officers are liaising with nuclear scientists at Kahuta, near Islamabad, to practice safe return after dropping the bomb.

Though China has been the main source providing design and has also enriched uranium and had collaborated with Pakistan in developing nuclear capability, help has also come through clandestine western sources. Pakistan and China signed a nuclear cooperation agreement in 1986.

Dr Khan came to Europe in December, ostensibly to meet friends and family members in Sweden. Many, however, feel that the real purpose was to meet scientists in connection with the forthcoming test in China. Mr Khan was detained by the Swedish police and deported to Pakistan.

Western countries, particularly the U.S. have been worried by the latest revelations. According to these sources, if Pakistan goes ahead with the test, it could jeopardize the \$670 million annual American aid. Pakistan, however, feels confident that despite the U.S.-Soviet agreement on Afghanistan, the Americans need Pakistan as an ally in South Asia.

The western sources say that in spite of assertions by Ms Bhutto that Islamabad has no desire for nuclear weapons, Pakistan is going ahead with their production. Her capacity to influence the Pakistani nuclear policy is doubted in western circles.

The late President, Gen Zia-ul-Haq, had amended the Pakistan constitution so that national security was the special responsibility of the Pakistan President and not of the prime minister. National security obviously includes the nuclear programme.

Ms Bhutto recently said in an interview with a Gulf newspaper that she did not know whether Pakistan had an atomic bomb. She reportedly said she had not been acquainted with the state secrets yet.

In any case, her anti-nuclear commitment is not taken seriously. She had earlier said that Pakistan was about to explode a nuclear device before the hanging of her father, Mr Zulfikar Ali Bhutto. In fact, she accused Pakistan's military rulers of neglecting the nuclear programme.

Whatever her assertions on the nuclear bomb, she has promoted scientists and technicians working on the nuclear project by at least one civil service grade.

Surface-to-Surface Missiles Successfully Tested

*BK1102155889 Islamabad Domestic Service in Urdu
1500 GMT 11 Feb 89*

[Text] Indigenously manufactured long-range surface-to-surface missiles were successfully test fired on the Makran Coast this morning. The missiles demonstrated the

desired performance. Today's demonstration was witnessed by senior civilian and military officials. Chief of the Army Staff General Mirza Aslam Beg was informed of this at a briefing in Karachi today. The missiles have been named Hatf-1 and Hatf-2. Hatf literally means lethal, and it is the name of the sword Prophet Muhammad used in several holy wars.

Hatf-1 and Hatf-2, whose striking ranges are 80 and 300 km, respectively, were test fired very successfully, and the purpose of the experiment was to test and further improve this system.

Indigenously made multibarrel rocket launchers were also tested, and their 25-kilometer-range test was successful. Attempts are being made to increase their range to 30 kilometers.

After the briefing, the chief of the Army Staff said this success is a milestone in the defense production sector and is a great tribute to our nation with a democratic ideology, under which national institutions like the Armed Forces are flourishing and achieving great success.

Scientist Denies Missiles Carry Nuclear Warheads

*BK2402035589 Islamabad Domestic Service in Urdu
0200 GMT 24 Feb 89*

[Text] The renowned scientist Dr Abdul Qadir Khan has said that Pakistan is now in a position to manufacture antitank and antiaircraft missiles at a much lower cost than that in the international market. In an interview with Radio Pakistan, he said the missiles produced by Pakistan cost only about 25,000 dollars each, as compared to those by foreign countries at a cost of \$50,000-100,000.

He categorically denied that these missiles can be used as nuclear weapons. The missiles have been manufactured to shoot down only low-flying aircraft, and they are so small they cannot carry nuclear warheads.

Concerning laser range finders, Dr Abdul Qadir Khan said it was very difficult to acquire them from other countries, as they cost about 10,000 pounds each. But Pakistan has manufactured this system at half the price, and its regular production has now started. He announced that the Pakistani laser finder has a striking range of 15 km, compared to only 8 km of the imported laser finder. We are working to increase the range of our laser finder up to 20 km; it weighs much less than the imported finders.

Answering a question about the enrichment of uranium, he said the project was launched when Canada stopped the supply of fuel for the Karachi Nuclear Power Plant, and the government had decided to achieve self-sufficiency in this field.

Dr Abdul Qadir Khan said he had come to Pakistan at the invitation of the late prime minister, Zulfikar Ali

Bhutto, and began work on this project. It was a very difficult project, as there had been no industrial base for this in Pakistan. However, my capable, hard-working, and dedicated colleagues accomplished this task in record time, he added.

Saudi Arabia To Aid Defense Production Program
BK2002110589 Delhi Domestic Service in English
0830 GMT 20 Feb 89

[Text] Pakistan says Saudi Arabia has agreed to assist Islamabad's defense production program in a big way.

The minister of state for defense, Mr Ghulam Sarwar Cheema, disclosed this to newsmen in Islamabad after his return from Saudi Arabia.

Reports say Pakistan has been seeking Saudi assistance to purchase combat planes, P-3 Airborne Early Warning Aircraft, and F-16 Falcon planes.

Saudi Arabia reportedly ceased aid to Islamabad after Pakistan withdrew troops from international security duties in Saudi Arabia last year.

Armenian Nuclear Plant Unit To Shut Down
LD1602184989 Moscow TASS in English
1842 GMT 16 Feb 89

[Text] "The first unit of the Armenian nuclear plant will be closed down in 10 days' time," Leonid Voronin, USSR first deputy minister of the atomic power industry, told TASS. A decision of the USSR Council of Ministers on the shutdown of the power plant and measures to provide the Transcaucasian republics with energy resources was taken last January as a forced measure after the Armenian earthquake.

The stoppage of the unit will evidently tell on the power budget of Armenia and Transcaucasia as a whole somewhat later, noted the deputy minister. "It is not accidental," Leonid Voronin went on to say, "that the first set will be closed down late in February, the last winter month, and the second in mid-March, when spring comes and it is warmer. We seek to ease the shortage of energy at the initial stage in this way."

An expert commission checked up the state of the unit on the spot and discussed how the cooling of the reactor and transportation of fuel will be carried out. Voronin pointed out that the Armenian atomic plant continues operating stably, and specialists have nothing to say on the entire technological cycle.

Citizens of the Transcaucasian republics and of the Soviet Union were informed of how the atomic plant will be stopped. The deputy minister noted that the intersectoral council for public relations was set up in the USSR in the recent past. One of its main tasks is to analyze the opinion of population on technical, economic, and ecological aspects of atomic energy uses.

Public Rejects Secrecy on Nuclear Waste
PM2202092589 Moscow KOMSOMOLSKAYA
PRAVDA in Russian 21 Feb 89 p 2

[Article by G. Mironova in "Own Correspondent's Column": "Special Secrets"]

[Text] Khabarovsk—Some 50 km from Khabarovsk we turned into a forest. Then the road disappeared behind iron gates. "Bolshekhokhtsirskiy Reserve" was written on the sentry box. But this was the entry to a special burial ground. Radioactive waste is brought here in heavy iron trucks.

Our acquaintance with radiation is limited to primitive civil defense exercises, in which we are shown a bomb in cross section and the ulcers caused by radiation sickness. Consequently, we are always ready to fear high radiation levels, without actually knowing from where this radiation could "crash down" on us. But it could come "crashing down" from directly above our heads. A man in Khabarovsk, for example, knocked "something"

down from the ceiling out of curiosity and proceeded to dismantle it in his workshop—thereby causing an incident, because it was a fire alarm containing an isotope.

Radioactive waste is not only sent for burial by institutes, plants, and hospitals but also by institutions very far removed from the "atom": cultural centers, sanatoria, libraries.... Instruments containing Cesium-137 can now be found in ordinary boiler rooms. It sometimes happens that anywhere up to 300 of these fire alarms are written off at the same time. They only respond sensitively when used correctly. That is why A.P. Yeniseyskaya, for example, who is head of a radiology department—the kind you find in any oblast or kray sanitation and epidemiology center—almost hates these isotope fire alarms. I, too, as the first honored visitor to the special burial ground, immediately found myself wondering: Isn't it possible to somehow avoid things like this? Fires are a danger, of course, but dangerous fire detectors are no better.

"They'll think of something," A.S. Tarasov, chief engineer of the enterprise concerned with the "dump," glumly reassured me, knowing that nothing else is on the horizon at present. Everything under his charge has its origins shrouded in deep secrecy. It is always easier when authorized personnel are the only people who understand these operations. Amateurs simply make life complicated with their naive questions, like the one I asked when confronted with a sign saying "Danger. Radioactive": "But why are radioactivity measuring devices not on sale in chemists' shops like thermometers?" Everyone was at great pains to explain things to me and I was allowed to handle more than 10 different instruments, in short supply, which radiation experts have worked hard to obtain from wherever possible. All this equipment is worth a fantastic amount of money. But of the equipment designed for individual use, only one instrument gave you a direct reading—this was some sort of tube registering dangerous doses. A cumbersome piece of equipment manufactured in 1953 was pronounced the most efficient and reliable. I had no choice but to believe I.V. Shteynikov, the senior radiation expert.

He calmly led us into a so-called contaminated zone. The needle registered the same 16 microroentgens per hour as in the city—the natural radiation background. Only, some radiation—invisible, silent, and intangible—had escaped through a small chink beneath a ferroconcrete slab. It amounted to 100 times the normal radiation background, even though the pill-sized radioactive elements are packed in lead and paraffin casings so thick that they weigh up to half a tonne.

Before Chernobyl, not a great deal of significance was attached to the situation with "things nuclear." That has now changed. Glasnost and democracy have freed the people in this respect also. They want to know everything and form their own, independent judgements.

There is now no greater topic of conversation in Khabarovsk Kray than the construction of the nuclear power plant included in the "Far East Program." It was included without the population's consent. The deputy minister of nuclear power generation, accompanied by an impressive group of specialists, flew here recently to explain the situation to people. But no discussion took place. At the meeting with the commission, the audience did not want to even hear its arguments: The monopoly of the department is over. The population has no wish to passively wait and see what "surprises" are served up by the power workers.

People have recently become disenchanted with the idea of remaining in blissful ignorance. They want to know about radiation levels in their city. They want to know what happens to dangerous waste. The public wants to know the sources of radiation and how dangerous this radiation is, and it is hard to ignore this today. One can understand how irritating this persistence is to departmental officials: In the past they were able to do what they wanted—even going as far as building a "special burial ground" in the local nature reserve.

Baklanov Inspects Thermonuclear Installation
LD2302113789 Moscow Domestic Service in Russian
1830 GMT 21 Feb 89

[Text] Scientists believe that the energy resulting from the fission and fusion of the nuclei of atoms is the most promising source of all methods of obtaining energy. In our country the Kurchatov Nuclear Energy Institute is responsible for resolving these tasks. This large scientific center was formed in 1943 and, as is known, was able to resolve a problem of vital importance for our country in a very short space of time and at a high scientific and

technical level: the development of homemade nuclear weapons as a counterbalance to the United States. After this the institute's scientists put forward the initiative for the peaceful use of atomic energy and launched vigorous research in this sphere. It is precisely here that the ideas of creating powerful atomic icebreakers, atomic power stations, and heat supply stations of atomic power-technological complexes were born.

On 21 February CPSU Central Committee Secretary Baklanov inspected Tokomak-15, our country's largest thermonuclear installation, at the Kurchatov Institute. Its development will make it possible to conduct research in the sphere of controlled nuclear fusion at a higher level. He familiarized himself with work on high-temperature superconductivity.

Academics Velikhov, Kadomtsev, Ponomarev, Stepanov, Belyayev, and other scientists told him of the collective's work.

Comrade Baklanov noted the exceptional importance of ensuring the guaranteed safety of atomic power engineering as the main condition of its social acceptability. It is a matter not only of improving in this area the existing types of nuclear AES reactors, but also of developing new ones with safety attributes that are organically inherent in them. Thoughts were voiced regarding the necessity of a substantial broadening and raising of the effectiveness of international cooperation in the sphere of nuclear power engineering, of improving the work of the institute's collective in the conditions of restructuring.

The CPSU Central Committee secretary acquainted himself in detail with the plans for the collective's further social development and for the organization of the work and daily life of the staff members.

EUROPEAN AFFAIRS

Protest To Be Lodged Against French Nuclear Plant

LD1002131889 Bern International Service in English
1000 GMT 10 Feb 89

[Text] The Geneva Cantonal Government has decided to lodge an appeal in France against the reopening of a nuclear power plant about 70 km from the border with Switzerland. The appeal will be lodged with France's highest administrative authority, the Council of State. A similar appeal has already been lodged by the city of Geneva and by Swiss and French antinuclear organizations. The plant at Creys Malville was closed for repairs 2 years ago, and antinuclear groups claim it is still not safe.

CANADA

Darlington Reactors Expected To Start on Schedule

51200018 Toronto THE GLOBE AND MAIL in English 18 Jan 89 p A5

[Article by Christie McLaren: "Hydro Confident Darlington Rector Will Start Up on Schedule"]

[Text] Ontario Hydro is confident there will be no more major delays at its Darlington nuclear station, a senior official at the Crown corporation says.

"I'm fairly confident that we're on track to bring these (nuclear) units on close to schedule," William Morison, Hydro's vice president of design and development, said in an interview yesterday.

Hydro will be working on a tight schedule in the next eight months to train staff, buy fuel, and satisfy federal government regulatory requirements so it can get a licence to start up the first of Darlington's four reactors next September, Mr Morison said.

"We're planning our best to be on schedule," he said, "but just like every other project in the world, if you're late and the interest goes up, it will cost more."

The Darlington plant, now under construction east of Metro Toronto, will cost more and take longer to complete than expected a year ago, according to Hydro's most recent estimates.

The four-reactor station will cost an estimated \$11.625-billion when completed in 1992, according to a September, 1988 report. That is \$725-million more than Hydro estimated a year ago, and \$225-million more than estimated last spring.

The costs have risen because Hydro has been forced to delay the start-up dates of Darlington's first two reactors by six or eight months, compared with the target dates of a year ago.

Delays have been caused by unforeseen construction problems and time-consuming training of staff to satisfy the federal government's safety and licensing requirements, Mr Morison said.

Every month of delay costs about \$20-million in additional costs, Mr Morison said, because Hydro is paying accumulating interest on capital it has borrowed to build the plant.

Opposition parties at the Ontario Legislature, who predict that Darlington's costs will continue to rise due to unforeseen circumstances, have been calling on the government to seriously consider the benefits of nuclear power.

Mr Morison and other Hydro officials have maintained that nuclear power is the most economical option available for creating electricity.

Some of the delays in Darlington have been caused because federal nuclear regulators in Ottawa have been dissatisfied with a new emergency shutdown system designed for the Darlington plant, a federal official said yesterday.

The federal Atomic Energy Control Board, which regulates Canada's nuclear industry, is not yet satisfied with Hydro's plans for a new computerized emergency-shutdown system for Darlington's four reactors, Zygmund Domaratski, head of reactor regulation for the agency, said in an interview yesterday.

Hydro's existing nuclear plants use a different, mechanical system to automatically shut off the reactor in case of an accident. The computerized system is a more up-to-date technology, Mr Domaratski said.

He said Hydro and AECB officials have been studying the design—particularly the computer software—for about two years.

"The design of the shutdown system, to our mind, wasn't adequate," he said.

Mr Morison said Hydro has now made the changes that Ottawa requested. "We've tested it and it works very well," he said. "We've essentially completed all that work."

Once the AECB is satisfied with the computer shutdown system, it will give Hydro permission to start loading fuel.

Hydro must also answer several outstanding questions about the safety of the Darlington plant in case of an accident.

Before Hydro gets a federal licence for the plant, the AECB must be satisfied with Hydro's safety studies, which indicate how the plant would respond in different theoretical accidents and if the public would be protected, Mr Domaratski said.

The AECB has been examining Darlington safety studies for almost two years, and Hydro still has questions to answer, he said.

"We have a lot of work left on our plate," Mr Domaratski said, adding that it will be "not weeks, but months" before Hydro gets its operating licence.

Proposed Nuclear Plant for Saskatchewan Sparks Controversy

51200017 Ottawa THE OTTAWA CITIZEN in English
26 Jan 89 p A13

[Text] Regina (CP)—Supporters of atomic energy say they are tired of the misinformation being spread by anti-nuclear activists and intend to fight back.

"One scientist has calculated you receive more radiation from sleeping with your wife than from leaning on a fence surrounding a nuclear reactor for eight hours a day," said Leon Katz, a former physics professor at the University of Saskatchewan.

Since a private Regina-based group of investors revealed plans last month to build a nuclear power plant in northern Saskatchewan, each side in the debate has accused the other of spreading false information on the safety and economic feasibility of nuclear energy.

Opponents insist the proposed \$1-billion Candu 3 reactor could be environmentally disastrous and additional energy needs can be met through better conservation.

Pro-nuclear people accuse opponents of deceiving the public on safety and the savings possible through other energy sources.

"The anti-nuclear people have over-exaggerated the effects of nuclear energy," Katz said in a telephone interview from Saskatoon.

"I don't belittle the sincerity of anti-nuclear people," he said. "Unfortunately, many of them are not experts. They do calculations that are meaningless and meant to be scary."

Contrary to what anti-nuclear forces are saying, there are not huge savings to be found in solar and wind power, Katz said.

"It would take a wind park two miles wide stretching from Regina to Winnipeg to equal (the output) of the Coronach plant," he said, referring to a coal-fired electrical generation station in southeastern Saskatchewan.

There isn't enough constant breeze in Saskatchewan to make wind power efficient, Katz said.

Solar power is costly, he said, because one would have to factor in the cost of manufacturing millions of panels to generate the amount of energy that could be produced by one nuclear plant.

Paul Watson, a founding member of Greenpeace and head of the Sea Shepherd Conservation Society, said environmentalists should do almost anything—including staging bizarre media events—to fight the proposed nuclear power plant in northern Saskatchewan.

Ontario Hydro Pondering Tritium Sale to United States

51200014 Ottawa THE OTTAWA CITIZEN in English
10 Jan 89 p A4

[Excerpt] Toronto (CP)—Ontario Hydro could have a "great market" by selling the United States its tritium, a rare radioactive substance used in nuclear bombs, a U.S. lawyer says.

But Hydro's board of directors, which had hoped to decide by late last year whether it would sell the product, is holding off on making a decision at least until the spring.

Hydro has been extracting tritium—a radioactive isotope also used in medical research and luminescent signs—from its Darlington installation for the last few months.

Since that time, its price has more than doubled and is now worth \$35,000 a gram.

This would make Hydro's anticipated 2.5-kilogram annual yield of tritium worth about \$75 million.

The increase is mainly because of a price hike by the U.S. Department of Energy—one of the very few commercial suppliers.

But a Hydro spokesman said the utility is waiting for some signal from the provincial government before deciding on what it should do.

An assistant to Ontario Energy Minister Robert Wong said the issue has not gone to cabinet and there is no timetable for any decision.

"It is obviously an issue of some concern," the assistant said.

"We are going to have to look closely at regulations and safeguards ... and whether (Hydro's product) is going to free up any tritium destined for weapons." [passage omitted]

No Home Found Yet for Experimental Slowpoke Reactor

51200015 Ottawa THE OTTAWA CITIZEN in English
22 Dec 88 p A4

[Text] Montreal—Atomic Energy of Canada is having a tough time finding a Canadian home for an experimental nuclear reactor it hopes to market around the world. On Tuesday, a hospital in Sherbrooke, Que., buckled under public opposition and backed out of a deal under which the Crown corporation would have built a demonstrator model for free. And despite earlier reports that a General Electric plant in Peterborough, Ont., might install a reactor, company spokesman Bob Beavers said the deal is off there too. The refusals are the latest in a series of setbacks for the small-scale Slowpoke reactor which Atomic Energy has been working on for 10 years and hopes will turn around the company's sagging fortunes.

FEDERAL REPUBLIC OF GERMANY

USSR Scientists Install Magnet for Hera Particle Accelerator

51002420 Stuttgart VDI NACHRICHTEN in German
2 Dec 88 p 37

[Article by Gero von Randow: "Desy Imports Soviet Ideas—Leningrad Shipyard Produced a 426-Ton Magnet"]

[Text] Hamburg—For years now FRG and Soviet scientists have been working together on a spectacular large-scale project that has been largely unnoticed by the political public: The new storage ring Hera [Hadron-Electron Ring Accelerator Facility] at the German Electron Synchrotron (Desy) in Hamburg—a model for cooperation between the East and the West.

Electrons are elementary, science assumes; but protons, which alone or together with neutrons form the atomic nuclei, are composite. Their building blocks are called "quarks"—and there is speculation that even quarks have a structure. In order to investigate the world of the smallest particles, decades ago science turned to a large-scale technology: The accelerators. In facilities of cyclopean dimensions, electrons, positrons, neutrons, and other particles are moved up into high-energy states; then they circle at almost the speed of light within so-called storage rings.

The designers of these facilities are using and developing the most advanced technologies. The racing particle packets must not collide with molecules that have strayed into

their path: A challenge for high-vacuum engineering. The magnets guiding the particle beam must generate a strength of several teslas within storage rings of the new generation: Unthinkable without superconducting windings. Such storage rings are high-technology aggregates that can be brought into the world only if several nations participate in their construction by means of top-quality breakthroughs. Such a facility is being built to the west of Hamburg and about 20 m below the surface of the earth. At the Desy large-scale research institute the accelerator Hera is being built. Hera will consist of two rings each with a circumference of 6.4 km, in which electrons and protons in packets of 100 billion each will move in opposite directions and with a speed of 50,000 revolutions per second. The electrons attain an energy of 30 giga-electron volts (GeV), while the protons reach as much as 820 GeV. As a comparison: A few GeV are reached in a television tube. These projectiles are aimed at one another within four chambers; what happens in head-on collisions should convey new knowledge about the finest structures of matter beyond our present-day understanding. Hera should permit the detection of structures down to a size of 10⁻¹⁸ cm.

"We are forming a sort of spearhead for international cooperation," confidently says Paul Soeding, a member of the Desy board of directors. This physicist heads the setup of the experiments at the Hera project. At present two detection apparatuses are being built, Zeus and H1, and scientists and engineers from over 80 institutes in 18 different countries are taking part in these projects. The detectors are housed in subterranean halls. In the H1 hall Soviet technicians and engineers are just now setting up the final components of an iron magnet 426 tons in weight. A Leningrad shipyard provided the thick sections. The iron yoke, as high as a house, has a fine inner structure and had to be manufactured far more precisely than, for instance, a ship's hull. The closeness to tolerance of the Soviet product has exceeded all expectations, it being said in Hamburg.

"With this tremendous drumroll a group from Moscow's Lebedev Institute has joined us," states Prof Soeding. "It is being led by the renowned Professor P.A. Cherenkov—the man who discovered the light effect named after him. I knew him only from textbooks, and then one day he turned up here unexpectedly and asked if he could assist in Hera." The Soviet Nobel Prize winner, 82 years old, still heads his group, which is making important contributions to the H1 experiment. A second Soviet institute is also taking part in H1: The world-famous Institute for Theoretical and Experimental Physics (ITEP) in Moscow. Moreover, there has been cooperation for years with high-energy physicists from Yerevan and with colleagues from the Siberian scientists' village Akademgorok—that enclave of ideas from which Gorbachev has assembled his staff of advisors.

The Hamburg scientists think highly of the originality of Soviet ideas. The Soviets are regarded as brilliant theoreticians. On the other hand, their problems are said to lie in the area of instruments. Certainly this is one reason

why they should interest themselves in Desy, which is one of a handful of institutes in the world where such large-scale and expensive engineering is available to science.

Facilities of this order of magnitude require not only scientific but also financial cooperation. The contributions of the participants are provided not mainly in money, but in components. In this area even the CEMA (Council for Economic Mutual Assistance) countries, which are poor in foreign exchange, can hold their own. This iron structure for the H1 detector with a value of DM 8 million—calculated on the basis of our own pricing framework—is the Soviet contribution to the financing of Hera. However, the foreign-exchange problem makes itself felt when it is a question of Soviet scientists staying in the West. But with good will and a little ingenuity some things can be done; for years now an average of 10 Soviet scientists have been working at Desy.

In the past, political travel restrictions have hindered cooperation; however, Soviet perestroika is leading to improvements here as well.

On the Western side there are restrictions as well. Desy must keep strictly to the Cocom [Coordinating Committee for East-West Trade Policy] list. "This is a nuisance, and it hinders our work," complains Prof Soeding. Technology transfer is simply a part of scientific exchange. For example, at the Soviet synchrotron UNK in Serpukhov, magnets with superconducting windings are being used that were developed at Desy. Here there were no Cocom problems; nevertheless it sometimes takes days to simply determine which circuits are allowed to be sent from this country to the East and which are not.

Paul Soeding is hoping for improved relations between Bonn and Moscow. Then perhaps the mutual reservations against an on-line interlinking of the computer and information systems in the German and Soviet institutes will also disappear. "We want these hookups, because there is also a danger of centralization: The key people will come here and their home institutes will empty out—that trend must be countered. This can be done only with computer hookups."

The construction work for the Hera tunnel and experimentation halls have been completed, and the electron ring is already in working order. The first two detectors are under construction. The experiments should begin in 1990.

Nuclear Exports to Pakistan Reported

AU2202093389 Hamburg DER SPIEGEL in German
20 Feb 89 pp 62-66

[Unattributed article: "Nuclear Exports—Just Open Doors"]

[Text] Pakistan has the ability to build the atom bomb. West German firms supplied parts and know-how.

The laboratory is hidden in a desert at the foot of the Kashmir mountains. Antiaircraft artillery protects the area, soldiers guard the doorways into and out of the laboratories, storehouses, and underground vaults.

In the laboratory, generators whirl, selected scientists operate highly sensitive aggregates; measuring instruments, vacuum pumps, and automated precision tools work around the clock.

In the nuclear plant, which forms part of the nuclear center of Pinstech near Rawalpindi, elements for the Islamic bomb are produced in strict secrecy—with machinery made in Germany.

The German equipment—for the time being the last delivery—was tested on site by Peter Finke, 45, on behalf of the Gelnhausen-based firm New Technologies (NTG). In July last year, the physicist showed his Pakistani colleagues for 2 weeks how to operate the complicated glove-compartment plant for the recovery of tritium.

Since then the scientist ("I am a pacifist") has had pangs of conscience; possibly the equipment could be "converted," he says. He stresses that anyway, a "pure training plant" was supplied—allegedly, in order to clean the tritium-contaminated Pakistani nuclear reactor in Karachi, which is, however, 1,100 km away.

Radioactive tritium is sold on the international black market of weapons-grade nuclear products at even higher prices than plutonium. A few grams of this gas are sufficient to increase the power of an explosive "substantially," says nuclear weapons scientist Gerhard Locke, 56, of the Euskirchen Fraunhofer Institute. Therefore, "the second bomb generation of the lighter type" cannot do "without tritium," he says.

However, the artificially produced superheavy hydrogen decomposes quickly into helium. Therefore, it must be constantly renewed.

That is precisely what the NTG plant can do: Every day, five grams of tritium can be recovered—a quantity which according to Locke is "incredibly large." That is why Albert Farwick, chief of the Hanau public prosecution which is investigating NTG, considers "some civil use practically inconceivable."

There is no doubt that Munir Ahmed Khan, chief of the Pakistan Nuclear Authority, with whom Finke already had a cup of tea, has secretly developed his country into a nuclear power; the bomb puzzle is complete. He had many individual parts—ranging from transformer sheets to uranium conversion—supplied by small West German firms, using a network of agents to this end.

The special pipes and supersolid steel from Singen and Saarbruecken, the mass spectrometers and magnets from Bremen and Bonn were made-to-measure for Khan's program which is carried out in a number of nuclear centers:

- In Rawalpindi, where in addition to the bomb plant, a 24-year-old U.S. research reactor is in operation and a reprocessing plant produces about 20 kg of plutonium every year;
- In Kahuta, Abdil-Kadir Khan, who is admired as "the new Einstein," meanwhile has produced more than 100 kg highly enriched weapons-grade uranium, using ultra-highspeed centrifuges;
- At the Dera-Ghazi-Khan center, natural uranium is pulverized and converted into uranium hexafluoride, the initial product for further processing, in three conversion plants supplied by the Freiburg businessman Albrecht Migule for DM15 million.

The Pakistani "atom shopping" has often had Bonn's official approval. The Federal Economics Office (BAW) in Eschborn approved the export of an electronically controlled milling machine of the Munich-based Friedrich Deckel AG, which a secret U.S. study assesses as "extremely useful" for the "production of elements of a nuclear explosive system;" the Economics Ministry rejected as "unacceptable and irrelevant" the U.S. demand to guarantee that the machine not be used in the nuclear industry.

The export of a special press to compact hard-metal powder, which was supplied by Dieffenbacher GmbH & Co in the Swabian town of Eppingen in 1985, was also approved, even though the purpose of the machine (price DM1.3 million) was not kept secret. The responsible officials knew that the isostatic hot press was intended "for use in an ammunition factory for the manufacture of heavy-metal cores for projectiles."

What types of cores could be meant was discovered post facto by experts of the Federal Research Ministry: "A highly efficient nuclear explosive "must be compressed to the largest possible extent, and "the easiest way" to achieve this is by using a press that is hardly different from the Dieffenbacher model.

The press and the milling machine, made in Germany, were so-called dual-use goods that can also be used for peaceful purposes and are therefore not contained in the embargo lists. However, the U.S. Administration had warned Bonn in time about such deals. U.S. intelligence services reported in 1979 that with the blueprints that he stole in Almelo, in the Netherlands, Abdil Khan was now in a position to build a uranium enrichment plant. To this end, he would buy "equipment on the European market," they said.

U.S. President Jimmy Carter wrote to Chancellor Helmut Schmidt at the time that "we must be careful and prevent this program from being completed." U.S. experts specifically went to Bonn to instruct the responsible officials. They told them that two firms, the Hanau-based Leybold-Heraeus and the Renningen-based Team Industries, were already "doing business."

Several weeks later, two managers of the enterprises mentioned informed the Economics Ministry that the deals had been carried out. Team Industries had just shipped 31 frequency converters to Pakistan, highly sensitive instruments that are used for the power supply of uranium centrifuges. Leybold-Heraeus manager Gotthard Lerch reported that his firm had supplied valves, vacuum pumps, brazing furnaces, measuring instruments, and a gas purifying plant "in the past 3 years"—together "worth DM1.3 million."

Lersch also said that of course, "it cannot be totally ruled out" that such instruments are useful in a uranium enrichment plant. He said that in the future he will "keep an eye on the aspect of possible use."

He did so. Meanwhile, the Cologne public prosecution is investigating Lerch, because he allegedly smuggled cases of blueprints for the building of a uranium centrifuge out of the Federal Republic. At the same time, he had a number of special instruments copied in Switzerland, the investigators say. The individual parts, which were declared "copper pipes, boilers, and crane girders," were transported across the French border by truck and were shipped in Air France planes from Lyon via Dubai to Pakistan.

The deal attracted attention after Swiss customs officers seized three specially large vacuum containers, so-called autoclaves.

The proceedings against Lerch have been dragging on for 2 years now. Only one West German exporter has been punished because of illegal nuclear exports to Pakistan: Albrecht Migule.

Quoting the Nuclear Nonproliferation Treaty, the judges said at the time that "owing to a law enforcement deficit, the FRG must accept being accused of having failed to meet its contractual obligations." They added that "the goals" of the nuclear nonproliferation treaty have been "attacked," because the authorities made it so easy for Migule that he did not have to proceed "particularly cleverly."

SPD Bundestag Deputy Hermann Bachmaier says that "the motto by which people in the Federal Economics Ministry work appears like a red thread in the files: You never hear anything, you never see anything—and in particular, you never block anything." Bachmaier, who heads the Bonn Nuclear Investigation Commission, says: "Our doors are just open."

The Karlsruhe Nuclear Research Center (KFK), which is 90 percent government-owned, also was involved in unrestrained exports. The KFK scientists supplied to their colleagues in Rawalpindi part of a mass spectrometer, without which it is impossible to determine the degree of uranium enrichment. They trained Pakistani scientists, and even allowed one of them to visit their sanctuary—the "hot cells" where plutonium is separated, and they passed on valuable know-how.

Even the Economics Ministry found the close contacts between Karlsruhe and the Pinstech laboratories "astounding." The ministry said that whereas "constant efforts are being made to inhibit the Pakistani nuclear program," the KFK "maintains very close contacts with relevant Pakistani authorities to convey know-how for just this nuclear program." No conclusions were drawn.

The same thing happened when roughly 100 kg of specially hardened steel was shipped from Bremerhaven to Karachi on 9 August 1985. The hot goods on board the "Nedloyd Everest" were just being shipped across the Red Sea, when it dawned on the German authorities that it might perhaps be the so-called maraging steel of Arbed Saartahl, which is subject to approval and is indispensable for the inside casing of uranium centrifuges, the rotors. The investigators later wondered why "so much fuss" was made about the shipment which involves a number of minor order addresses; however, the proceedings were discontinued.

No matter whether computer systems were involved that can be used for the "control of weapons systems," highly sensitive electronic hardware or ring magnets which according to reports of the Federal Intelligence Service just corresponded to the dimensions of the Pakistani high-speed gas centrifuge of the second type (German version). A coincidence? The officials in the Bonn Economics Ministry always felt pestered, instead of feeling challenged to intensify their checks, when the Foreign Ministry passed on secret documents of U.S. intelligence services warning about planned deliveries.

Such "anonymous papers usually end up in my wastebasket," Guenter Welzien of the Federal Economics Institute furiously wrote to the Economics Ministry, wondering whether Bonn had "ever bombarded the Department of Commerce in a similar way?" Even when the Americans asked Bonn to find out about negotiations conducted by German firms on the possible sale of so-called cryotrons—tiny electronic elements with which the time a bomb detonates can be determined with an accuracy of one-millionth of a second—the Federal Economics Ministry's reaction was particularly rough. A responsible official called Spies scribbled on a piece of paper: "I reject such employment measures on principle."

However, the request had not been that absurd, after all. Rudolf Maximilian Ortmayer, at the time NTG manager, reportedly also negotiated in Pakistan with a man called Sulfikar Ahmed Butt—the very Pakistani who had

attracted attention in the United States when he was trying, via agents, to purchase 50 cryotrons from EG & G Inc, Wellesley, Massachusetts, the only producer in the world. Butt, who is considered to be the chief buyer for the Pakistani bomb builders, reportedly presented to Ortmayer a comprehensive wish-list.

However, the negotiations were only more specific regarding tritium: Butt ordered 10 grams.

The nuclear buyer soon was not interested any more in the heavy water clearing plant that the Pakistanis initially planned to buy, although Ortmayer had engineered everything so nicely to legalize the deal. He invited the responsible official of the Federal Economics Institute, Manfred Ruck, and the Bonn expert Spies to see him in Gelnhausen. Having a glass of sherry, the gentlemen discussed the export wishes.

Ruck wrote to his colleague Spies that the plant is absolutely harmless, comparable, "in a figurative sense, to a drinking water treatment plant."

The application was approved.

Nuclear Center on Cooperation With Pakistan
LD2002131689 Hamburg DPA in German
1119 GMT 20 Feb 89

[Excerpt] Karlsruhe, (DPA)—The Karlsruhe Nuclear Research Center (KFK) has made it clear that its cooperation with Pakistan is based on a governmental accord and on an agreement on the peaceful use of nuclear energy of 1974. This was how the KFK reacted to a report in the news magazine DER SPIEGEL about nuclear-weapons-related supplies by German firms to Pakistan. The KFK, which is 90 percent federal-owned, was also said to have been involved in the deals and had supplied "parts for a mass spectrometer" as well as having trained nuclear researchers from Pakistan.

In response to these changes, the KFK stated that the parts for a mass spectrometer had been supplied to the Pakistan Institute for Science and Technology and were for analysis of trace substances as part of a joint research program on soil salting in the Punjab.

On the training of Pakistani scientists, the KFK advised that contacts in the so-called sensitive area had taken place only twice at the start of cooperation in 1974 and 1975. [passage omitted]

Shutdown of AVR Pebble-Bed Reactor Examined
51C02415a Stuttgart VDI NACHRICHTEN
in German 11 Nov 1988 p 25

[Article: "An Experimental Power Plant Becomes History. AVR Pebble-Bed Reactor Decommissioned; Future HTRs will Profit from the Experience Gained in the Large-Scale Fuel Element Test"]

[Text] Juelich, 11 Nov—The pebble-bed reactor of the AVR [Experimental Reactor Consortium] in Juelich,

which went on line for the first time in 1967, will be decommissioned at year's end. The excellent results achieved during operation of the high-temperature experimental reactor have helped to convince the Soviet Union to work together with West German companies in the planning and construction phases of future plants. Dr Rudolf Schulten, father of the pebble-bed reactor and current director of the Reactor Development Institute of the Juelich Nuclear Power Research Facility, describes in the following article how the AVR came to be, and its significance in the field of nuclear engineering.

The history of nuclear engineering will reflect two important results, or one could say two important discoveries made during the operation of the AVR: on the one hand, automatic temperature stabilization at a safe level in the event of an accident in which the cooling system and the shutdown mechanism for the nuclear reaction fail simultaneously, and on the other hand, good retention of radioactive fission products by the fuel elements themselves even under off-normal temperature conditions.

In 1957, however, when I met with the technical director of municipal utilities in Duesseldorf, Mr Cautius, for a cup of afternoon coffee in a little village in the Black Forest, the focal point of interest was not the above-mentioned new ways of making nuclear energy safe, but rather the ability to build small reactors which would operate under high temperature and standard steam conditions.

He liked the pebble-bed reactor with its high-temperature ceramic graphite fuel elements and the option of loading and unloading the fuel elements during operation. The method of transferring heat from the reactor core to the steam generator using corrosion-free helium was also in line with his technical viewpoint. This was a time in which there were heated discussions in the FRG concerning the advantages of the "neighborhood power plant" concept. Providers of municipal electricity were of the opinion that the existence of such plants was entirely justified by their low energy production costs compared to that of large-area high-voltage grids.

Cautius and his colleagues wanted to use the AVR to prove that nuclear energy was worth considering even in the form of small plants. Ultimately, the long operating history of the AVR proved him right. To day, small high-temperature reactors are looked upon with interest throughout the world—in the U.S., the USSR and the People's Republic of China, for example.

At the conclusion of a development program lasting several years, which also included the planning of the reactor, construction got under way, and in December of 1967, the AVR delivered electricity to the public power grid for the first time.

The design of the high-temperature reactor, and thus of the AVR itself, was based on the laws of physics. In the field of conventional power plant engineering it had been

customary to achieve high efficiency values at high temperatures. In nuclear reactors, however, the necessary high temperatures can only be achieved through the use of ceramic materials.

As soon as the decision was made to use ceramic fuel elements, the brittle nature of such materials had to be considered. Here, spherical fuel elements were the logical answer. For a number of reasons, graphite is the only material which comes into consideration. Corrosion-free helium is well suited as the heat transfer agent.

The AVR consists of a pebble bed of 100,000 fuel elements enclosed in a graphite container with a diameter and height of approximately 3 m. This graphite container is also called the neutron reflector. The heated helium flows through the upper part of the graphite reflector and into the steam generator located above the reactor.

During the design phase it was determined that metal materials were not necessary in the hot upper zones. This allowed the temperature to be increased over the long operating life of the reactor, so that the temperature range was most often in the vicinity of 1000 degrees C. This high temperature also showed that nuclear heat could also be used in the realization of chemical processes such as the gasification of coal.

An important part of the development of the AVR reactor was the manufacture of coated particles—the actual reactor fuel elements. These particles have a diameter of less than 1 mm, and are made of thorium-uranium mixed oxide. They are surrounded by several layers of carbon and silicon carbide, and are therefore extremely heat-resistant. And, as many accompanying experiments have shown, they are able to retain radioactivity reliably up to a temperature of approximately 1600 degrees C.

Roughly 20,000 to 30,000 such particles are contained in one spherical fuel element, which in turn has a diameter of 6 cm. Various different fuel compositions are available, such as the above-mentioned thorium-uranium mixed oxide, but low-level enriched uranium can also be used. A conversion from one fuel to another has been performed during reactor operation.

The excellent behavior of the AVR reactor throughout its service life led little by little to the determination that failure of both the cooling system and the shutdown mechanism for the nuclear reaction were not dangerous, as only a slight temperature increase occurs when the most important safety-related reactor components fail, and a release of radioactivity is not to be feared. At the same time, automatic procedures shut down the reactor within a period of approximately half a minute.

We were particularly astonished to find only a small release of fission products in the reactor loop despite the extremely high temperatures. According to prior experiments and theoretical considerations, contamination of

the reactor loop—particularly by cesium and iodine—should have been much greater. It was therefore demonstrated that the radioactive substances released are contained by the graphite even at extremely high temperatures, e.g., 1000 degrees C. In this system the graphite acts as a filter.

This phenomenon was thoroughly investigated in parallel experiments. It was determined that the pores in the coke binder which is used to manufacture the graphite was the actual cause of this amazing retention of fission products. This phenomenon, specifically, is a new and welcome piece of information which will be very useful to us in terms of safety engineering.

These two phenomena, automatic reactor stabilization during accidents on the one hand, and strict retention of radioactive fission products on the other, result in a particularly high safety level in terms of the design concepts of the high-temperature reactor.

In the case of small reactors with power ratings of 200 to 250 MW (th), automatic stabilization can be achieved during accidents in that the release of radioactivity from the fuel elements is prevented because the temperature inside the reactor does not exceed 1600 degrees C during any accident.

For reactors with intermediate power ratings, in the range of 1200 MW (th), for example, which can be thought of as successors to the THTR reactor (in Hamm-Uentrop), the filter effect for fission products within the reactor loop can be used to contain all radioactive substances. Experiments have shown, however, that graphite doping is required for radioactive iodine.

Both effects can now be used to prevent the release of radioactivity during accidents. The AVR has thus become an important milestone in terms of obtaining safe nuclear energy in the future.

UNITED KINGDOM

Contingency Plans for Nuclear Disaster Reviewed
51500077 London THE DAILY TELEGRAPH
in English 9 Jan 89 p 4

[Article by John Weeks]

[Text] Government contingency plans to deal with a nuclear disaster, including a scheme to combat a terrorist group if they had access to an atomic land mine, are being reviewed by the Ministry of Defence and the Home Office after the bombing of the Pan Am Jumbo which crashed in Lockerbie.

In addition, police training for security measures at air and sea ports and action following a nuclear accident or a deliberate act by a group such as the IRA, is under scrutiny.

A task force of scientists and senior Army officers to deal with the remote possibility of the IRA obtaining an atomic land mine which could be detonated remotely was set up last June.

Service and police chiefs realized then that if the IRA managed to get hold of such a weapon from a sympathetic country such as Libya or by breaking into a Nato base in Europe, they had no way of combating them.

Contingency plans have now been formulated and key police officers are to be trained to help the scientists and the Army. The atomic land mine weighs about 30lbs and has a limited radioactive fall out. Damage is largely confined to within 1,000 yards of the explosion.

The Ministry of Defense and the Home Office would not discuss details of contingency plans, but a Home Office spokesman added: "There are plans to cover a range of eventualities."

Details of Loss of Uranium, Plutonium Released
51500078 London THE DAILY TELEGRAPH
in English 11 Jan 89 p 4

[Article by Roger Highfield, Science Editor]

[Text] More details of Government plans to deal with nuclear terrorism emerged yesterday as official statistics revealed a loss of material deposited at British nuclear sites.

The Atomic Energy Authority and British Nuclear Fuels published details yesterday of "materials unaccounted for" arising from the use of uranium and plutonium, in their civil nuclear programmes during 1987-88.

Figures show a loss of 4.7 kilograms of plutonium, which is enough to make a nuclear device, from Dounreay in Scotland (3.2 kg) and Sellafield in Cumbria (1.5 kg).

However, the authorities said the discrepancy was due to accounting errors and gave "rise to no concern over safety or security" of the authority or British Nuclear Fuels plants.

A group of experts from a range of agencies, formerly called the Counter Improvised Nuclear Device Emergency Response, has held several exercises to deal with nuclear terrorism at sites such as Chatham Dockyard and at Woolwich since 1985.

In the exercises, sophisticated equipment across the country has been used to overcome booby traps protecting a dummy nuclear weapon, locate fissile material with the help of radiation monitors, defuse the device and decontaminate the area.

This is a U.S. Government publication. Its contents in no way represent the policies, views, or attitudes of the U.S. Government. Users of this publication may cite FBIS or JPRS provided they do so in a manner clearly identifying them as the secondary source.

Foreign Broadcast Information Service (FBIS) and Joint Publications Research Service (JPRS) publications contain political, economic, military, and sociological news, commentary, and other information, as well as scientific and technical data and reports. All information has been obtained from foreign radio and television broadcasts, news agency transmissions, newspapers, books, and periodicals. Items generally are processed from the first or best available source; it should not be inferred that they have been disseminated only in the medium, in the language, or to the area indicated. Items from foreign language sources are translated; those from English-language sources are transcribed, with personal and place names rendered in accordance with FBIS transliteration style.

Headlines, editorial reports, and material enclosed in brackets [] are supplied by FBIS/JPRS. Processing indicators such as [Text] or [Excerpts] in the first line of each item indicate how the information was processed from the original. Unfamiliar names rendered phonetically are enclosed in parentheses. Words or names preceded by a question mark and enclosed in parentheses were not clear from the original source but have been supplied as appropriate to the context. Other unattributed parenthetical notes within the body of an item originate with the source. Times within items are as given by the source. Passages in boldface or italics are as published.

SUBSCRIPTION/PROCUREMENT INFORMATION

The FBIS DAILY REPORT contains current news and information and is published Monday through Friday in eight volumes: China, East Europe, Soviet Union, East Asia, Near East & South Asia, Sub-Saharan Africa, Latin America, and West Europe. Supplements to the DAILY REPORTs may also be available periodically and will be distributed to regular DAILY REPORT subscribers. JPRS publications, which include approximately 50 regional, worldwide, and topical reports, generally contain less time-sensitive information and are published periodically.

Current DAILY REPORTs and JPRS publications are listed in *Government Reports Announcements* issued semimonthly by the National Technical Information Service (NTIS), 5285 Port Royal Road, Springfield, Virginia 22161 and the *Monthly Catalog of U.S. Government Publications* issued by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.

The public may subscribe to either hardcover or microfiche versions of the DAILY REPORTs and JPRS publications through NTIS at the above address or by calling (703) 487-4630. Subscription rates will be

provided by NTIS upon request. Subscriptions are available outside the United States from NTIS or appointed foreign dealers. New subscribers should expect a 30-day delay in receipt of the first issue.

U.S. Government offices may obtain subscriptions to the DAILY REPORTs or JPRS publications (hardcover or microfiche) at no charge through their sponsoring organizations. For additional information or assistance, call FBIS, (202) 338-6735, or write to P.O. Box 2604, Washington, D.C. 20013. Department of Defense consumers are required to submit requests through appropriate command validation channels to DIA, RTS-2C, Washington, D.C. 20301. (Telephone: (202) 373-3771, Autovon: 243-3771.)

Back issues or single copies of the DAILY REPORTs and JPRS publications are not available. Both the DAILY REPORTs and the JPRS publications are on file for public reference at the Library of Congress and at many Federal Depository Libraries. Reference copies may also be seen at many public and university libraries throughout the United States.

END OF

FICHE

DATE FILMED

29 March 1989